NATURAL RESOURCES DEFENSE COUNCIL

By Electronic and Overnight Mail

May 24, 2006

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Re: Proposed Incidental Take Authorization for the U.S. Navy's Rim of the Pacific (RIMPAC) Training Exercise

Dear Mr. Leathery and Mr. Payne:

On behalf of the Natural Resources Defense Council ("NRDC"), the International Fund for Animal Welfare, Cetacean Society International, the League for Coastal Protection, Ocean Futures Society, Jean-Michel Cousteau, the Humane Society of the United States, the Whale and Dolphin Conservation Society, the Center for Biological Diversity, Oceana, and our millions of members, we write to express our concern over the authorization proposed for the U.S. Navy's Rim of the Pacific ("RIMPAC") exercise. 71 Fed. Reg. 20986 (Apr. 24, 2006).[1] For the numerous reasons set forth below, we urge you to deny the Navy's application.

As you know, RIMPAC is not a routine exercise: it is the largest multinational training event for the Navy's Pacific Fleet, and it involves a staggering array of activities in and around the main Hawaiian Islands. Individually and collectively, many of these activities pose a significant risk to Hawaii's unique environment. Some make use of live ordnance, some require explosives, and still others employ high-intensity, mid-frequency sonar, a technology that has been linked to a growing number of mass mortalities of cetaceans and

[1] We are aware that comments on this proposed harassment authorization may be submitted separately by government agencies, individual scientists, environmental organizations, and the public. The comments that follow do not constitute a waiver of any factual or legal issue raised by any of these organizations or individuals and not specifically discussed herein. We hereby incorporate by reference comments submitted to the Navy on its Draft Supplemental Programmatic Environmental Assessment for the 2006 RIMPAC exercise (available to the public at www.smdcen.us/rimpac06) and on its Draft Environmental Impact Statement for the Undersea Warfare Training Range (available to the public at projects.earthtech.com/USWTR/Public_Involvement/Public_Comments.html).

whose impacts on marine life have been the subject of broad scientific and public concern.[2] The dangers of mid-frequency sonar are well known in Hawaii. During the 2004 RIMPAC exercise, some 150-200 whales from a species that is rarely seen near shore and had never naturally mass-stranded on Hawaii came into Hanalei Bay, on the island of Kaua'I; and NMFS itself has concluded that naval sonar was a "plausible, if not likely" cause.[3] In all, the Navy has proposed to conduct 44 anti-submarine warfare exercises around the islands, each exercise involving one to five sonar vessels plus one or more helicopters and fixed-wing aircraft—for a total of 532 exercise hours condensed into a four-week period. RSPEA at 2-10.

Remarkably, the Navy has asked you to authorize RIMPAC 06 through a rushed process that does not respect the scope of the exercise, the scientific literature on sonar, or the legal standards that apply. It would have you conduct your NEPA review under an environmental assessment rather than an environmental impact statement, despite the impossibility in this case of making a "finding of no significant impact"; and it would have you approve its marine mammal takes through a harassment authorization rather than a regulatory permit, despite a proven risk of whale mortalities that a mere authorization cannot cover. Yet the Navy had two years since the 2004 strandings to do the right thing—to prepare an environmental impact statement ("EIS"), conduct a proper alternatives analysis, and bring its biennial exercise into genuine compliance with the law. It did not, and now it asks your agency to join in its mistake.

From a legal perspective, the only responsible decision would be to deny the Navy's authorization request outright. That decision would require the Navy to conduct a thorough alternatives analysis, consider the cumulative effects of multiple exercises, and work through long-term problems of mitigation, monitoring, and impact assessment before Hawaii is put through another major event. It would also keep NMFS from independently violating the MMPA and NEPA in the numerous ways that are outlined below. NMFS suggests several times in its proposed authorization that an effective monitoring and mitigation plan will cure its legal problems, but its current plan falls far short of the mark, and some of its problems are simply incurable. We are afraid, given how far the process has come, that NMFS will move forward with an authorization; in that case, we at least urge you to maximize mitigation in accordance with the law. But mainly we urge you to do the right thing by your institution—and by the species you're entrusted to protect—and reject the Hobson's choice that the Navy has pressed upon you.

I. THE SUFFICIENCY OF NMFS' MITIGATION MEASURES

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[2] For a summary of RIMPAC activities, see Navy, Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment 2-1 to 42 (2002) (hereinafter cited as "PEA"); Navy, 2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment: Revised Preliminary Final 2-3 (Apr. 2006) (hereinafter cited as "RSPEA").

[3] B.L. Southall, R. Braun, F.M.D. Gulland, A.D. Heard, R.W. Baird, S.M. Wilkin, and T.K. Rowles, Hawaiian Melon-Headed Whale (Peponacephala electra) Mass Stranding Event of July 3-4, 2004 at 2 (2006) (NOAA Tech. Memo. NMFS-OPR-31).

In authorizing "take," whether through a regulatory permit or through a one-year harassment authorization, NMFS has the burden of meeting the MMPA's high standard for mitigation. Specifically, the agency must prescribe "methods" and "means of effecting the least practicable impact" on marine mammals and set additional "requirements pertaining to the monitoring and reporting of such taking." 16 U.S.C. §§ 1371(a)(5)(A)(ii), (D)(vi). While NMFS is required to consult with the Department of Defense before making a determination under this provision (id.), the "least practicable impact" standard is, in any event, a rigorous one. NRDC v. Evans, 279 F.Supp.2d 1129, 1158-64 (N.D. Cal. 2003); NRDC v. Navy, 857 F.Supp. 734, 737-39 (C.D. Cal. 1994). As discussed below, it is clear that, in several respects, the MMPA's mitigation standard has not been met. Nor has the agency prescribed mitigation sufficient to make an affirmative finding of negligible impact, as required by 16 U.S.C. §§ 1371(a)(5)(A)(i), (D)(i)(I).

But NMFS has placed itself under a even greater statutory burden given the inadequate procedures it proposes to follow. Effective mitigation is the basis of both the Navy's conclusion that RIMPAC will not result in significant environmental impacts (the potential for which requires an EIS) and NMFS' conclusion that RIMPAC will not seriously injure or kill marine mammals (impacts that could not be authorized except by regulation).[4] The Navy's insistence on a rushed process—its failure to do the right thing years ago and engage in a thorough environmental review—means that the bar for mitigation rises even above the MMPA's rigorous "least practicable impact" standard.

Simply put, NEPA disfavors the use of mitigation to avoid preparation of an EIS. The Council on Environmental Quality, in interpreting its NEPA regulations, has specifically cautioned against using mitigation in this manner, stating that, "[a]s a general rule, . . . agencies should use a broad approach in defining significance and should not rely on the possibility of mitigation as an excuse to avoid the EIS requirement." 46 C.F.R. 18026, 18038 (March 23, 1981). Courts place a substantial burden on agencies that proceed regardless of this general rule. If an agency relies on mitigation measures, such measures must "constitute an adequate buffer against the negative impacts that may result from the authorized activity." Nat'l Parks & Conservation Ass'n v. Babbitt, 241 F.3d 722, 734 (9th Cir. 2001). They must "render such impacts so minor as to not warrant an EIS." Id. Further, the agency may not speculate that its mitigation measures will suffice to prevent environmental harms. Found. for N. Am. Wild Sheep v. U.S. Dept. of Agr., 681 F.2d 1172, 1179 (9th Cir. 1982). The measures it relies on must be supported by analytical data (Idaho Sporting Congress v. Thomas, 137 F.3d 1146, 1151 (9th Cir. 1998)), for uncertainty about their effectiveness only heightens the need to prepare an EIS. Nat'l Parks & Conservation Ass'n, 241 F.3d 722 at 735-36.

[4] Navy, Revised Preliminary Final 2006 Supplement to the 2002 RIMPAC PEA [hereinafter "RSPEA"] at 7-2 to 7-3 (Apr. 2006); 71 Fed. Reg. 20999-20100.

Given the agency's determination to approve RIMPAC under a harassment authorization, its burden under the MMPA is also considerable. Kokechik Fishermen's Association v. Secretary of Commerce, 839 F.2d 795, 801-02 (D.C. Cir. 1988).

In summary, to avoid violating both the MMPA and NEPA, your agency must adopt mitigation that (1) effects the least practicable adverse impact, (2) renders the Navy's impacts "so minor as to not warrant an EIS," (3) is backed by data sufficient to clearly support a Finding of No Significant Impact, (4) ensures that takes do not exceed the MMPA's negligible impact standard, and (5) precludes the risk of serious injury or mortality, which can be authorized only by regulation. NMFS' mitigation measures as proposed do not meet these stringent requirements.

A. Geographic Exclusions

Geographic exclusion has been recognized by the IWC Scientific Committee, by other international bodies, by foreign governments, and by expert commentators as an essential mitigation measure for producers of intense ocean noise.[5] Its use in this case is absolutely critical given the distances at which impacts are expected and the extraordinary difficulty of monitoring species even within a short distance of a sonar vessel, which typically would be moving through the ocean at rapid speed, as fast as 20-30 knots. NMFS must improve its geographic mitigation.

1. Coastal Exclusion Zone

In its draft authorization, NMFS proposes a coastal exclusion zone for mid-frequency sonar operations that would run 25 km seaward of the 200 m isobath around the Hawaiian islands. 71 Fed. Reg. 20998. While including a coastal exclusion of any kind represents an improvement over the Navy's standard operating procedure, NMFS' exclusion zone does not adequately protect island-associated populations from significant impacts. Aerial survey data indicate that short-finned pilot whales, spotted dolphins, spinner dolphins, and bottlenose dolphins occur in higher densities within 25 nm of shore;[6] and data from a ship-based study confirm that at least some of these

[5] See, e.g., International Whaling Commission, 2004 Report of the Scientific Committee at Annex K and § 12.2.5.3; CONAMA [Brazil] -National Environment Council Res. 305 (July 2004) (excluding seismic exploration from Abrolhos Banks to protect humpback whales); Statement of Bono Martinez (3 Nov. 2004) and Resolución 79/2004, 102 Boletín Oficial del Estado 16643-45 (excluding sonar exercises from Canary Islands); Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area (ACCOBAMS) Res. 2.16, Adopted at the 2nd Meeting of Parties in Majorca, Spain (2004); IUCN-World Conservation Union, Resolution 53 (Undersea Noise Pollution), Adopted at the 3rd World Conservation Congress in Bangkok, Thailand (2004).

[6] J. Barlow, Cetacean Abundance in Hawaiian Waters Estimated from a Summer/Fall Survey in 2002, 22 Marine Mammal Science 457-58 (2006) (comparing Barlow's results to Mobley's).

species occur with some frequency within the outer half of that range.[7] Given the available evidence, an appropriate basic exclusion zone for these species would run 25 nm, rather than 25 km, from the 200 m isobath. NMFS gives no indication that such distances are impracticable for the Navy; indeed, the Royal Australian Navy's guidelines, which include a seasonal zone of 30 nm for sonars operating above at 210 dB re 1 μPa, demonstrate the practicability of an exclusion that is almost twice the distance currently proposed.[8] It is essential, moreover, that the exclusion area be protected with a buffer zone that effectively minimizes species take. During the 2004 mass stranding of melon-headed whales, which appears to have occurred under surface ducting conditions, signals from ships in the Pacific Missile Range Facility, some 40 to 50 km away, peaked above 150 dB re 1 μPa at the mouth of Hanalei Bay; mean received levels ran as high as 148 dB re 1 μPa. RSPEA at D-3 to D-8. To reduce the impacts of surface ducting within the coastal exclusion zone, the buffer should extend seaward at least 20 nm from the 25 nm boundary.

2. Offshore Exclusion Areas

NMFS must also exclude offshore areas that may have higher global densities of marine mammals. It is well established that several species of particular concern in this exercise—including Blainville's beaked whales and endangered sperm whales—as certain other marine mammal species tend to congregate around steep-sloping areas, such as seamounts. See, e.g., Baird Comment Letter at 4. There are a number of seamounts around the Hawaiian Islands, including several to the west of the Big Island that rise within 1000 m of the surface; those seamounts that occur within the Navy's operating areas (RSPEA at Fig. 2-1) should be excluded from ASW exercises. Baird Comment Letter at 4. Likewise, NMFS should exclude areas where oceanographic conditions can increase productivity and attract offshore concentrations of animals. In this regard, strong evidence has been presented for exclusion of the offshore area west of the Big Island. The cyclonic eddies that occur there are a regular occurrence, have been recorded in summer, can last several months, result in significant increases (by at least a factor of two) in primary productivity, and have been linked to significant increases in higher trophic species. The exclusion area would include (at least) the western half of Navy modeling area '3' and a substantial portion of modeling area '5'.[9]

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[7] In this survey, bottlenose dolphins and spotted dolphins were sighted beyond 30 km from shore despite a concentration of effort within 30 km. Letter from Robin W. Baird, Ph.D., to Stephen L. Leathery, NMFS [hereinafter "Baird Comment Letter"], at 4 (May 20, 2006).

[8] Royal Australian Navy "Maritime Exercise Areas Environmental Management Plan," Procedure S-1 (June 9, 2004).

[9] Id. (citing two papers by Seki et al., 2001 and 2002); M.P. Seki, R. Lumpkin, and P. Flament, Hawaii Cyclonic Eddies and Blue Marlin Catches: The Case Study of the 1995 Hawaiian International Billfish Tournament, 58 J. Oceanography 739, 739-45. According to the authors, the eddies are "nowhere more conspicuous or spin up more frequently than in the Alenuihaha Channel" (id. at 739)—where, of course, the Navy proposes to conduct a chokepoint exercise.

The fact that neither NMFS nor the Navy has undertaken analyses of offshore areas, either to confirm increased densities of marine mammals at the indicated sites or to identify others worthy of mitigation, does not somehow absolve the agencies from excluding areas based on the available evidence. Indeed, NMFS should understand that any uncertainties about the efficacy of excluding these areas from sonar exercises are further reason to prepare a full EIS. Nat'l Parks & Conservation Ass'n, 241 F.3d 722 at 734-35 (requiring Coast Guard to perform EIS on increased shipping traffic in Glacier Bay).

3. Use During Ship Transits

NMFS cannot authorize sonar use during ship transits between exercise areas. It was precisely this type of activity that, according to NMFS' recent report, was a "plausible, if not likely" contributor to the 2004 mass stranding of melon-headed whales in Hanalei Bay.[10] If the agency does not bar sonar use by transiting ships, the Navy would have license to operate the same sonar systems, at the same power levels, in the same areas it was using in 2004. Such an outcome is not tenable under a harassment authorization.

4. Marine Protected Areas ("MPAs")

Executive Order 13158 requires agencies "to avoid harm to the natural and cultural resources that are protected by a MPA." E.O. 13158 (May 26, 2000). The Executive Order defines MPAs broadly to include "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein." Id. NMFS must therefore consider and, "to the maximum extent practicable" (id.), avoid harm to the resources of all federal- and state-designated protected areas—including but not limited to the Hawaiian Islands Humpback Whale National Marine Sanctuary—that are potentially affected by the RIMPAC event.

B. Lowest Practicable Source Level

In its draft authorization, NMFS proposes requiring the Navy to conduct its exercises at "the lowest practicable level, not to exceed 235 dB, except for occasional short periods of time to meet tactical training objectives." 71 Fed. Reg. 20998. While source level reductions are an important requirement, the standard articulated here falls short of what NEPA and the MMPA demand in this instance. First, since the Navy did not model impacts from source levels above 235 dB re 1 μPa (RSPEA at 20998), it has effectively failed to assess all reasonably foreseeable impacts as required by NEPA, and NMFS would be in patent violation of both NEPA and the MMPA's negligible impact provision if it authorized such use. Therefore any training with tactical sonar above a nominal source level of 235 dB should be prohibited.

[10] Southall et al., Hawaiian Melon-Headed Whale at 2.

Second, NMFS must consider requiring the Navy to operate at source levels below 235 dB, throughout the exercise or at least in some circumstances. NMFS itself recognizes the considerable value to be gained, under a logarithmic decibel scale, from even a 6 dB reduction in power: the reduction "would reduce the range of potential acoustic effects to about half of its original distance… [which, in turn,] would reduce the area of acoustic effects to about one quarter of its original size." 71 Fed. Reg. 20988.[11] Making such a reduction explicit is necessary given the Navy's summary dismissal, in the RSPEA (at 2-13), of all other possible alternatives and mitigation measures. See, e.g., Simmons v. U.S. Army Corps of Eng'rs, 120 F.3d 664, 667 (7th Cir. 1997) (an EIS errs when it accepts "as a given" parameters it should have studied and weighed). Since the Navy has effectively ruled out operating its standard tactical sonar below 235 dB, NMFS' mitigation measure—without further definition—would achieve no real-world mitigation at all.

C. Safety Zone and Shut-Down Procedures

1. Safety Zone Distances

In its draft authorization, NMFS expands the Navy's safety zone from the anemic distances set forth in its operating procedures. Under ordinary conditions, the Navy would power down its sonar by 6 dB if an animal is detected within 1000 m of an array, power down by 10 dB if detected within 500 m, and shut down if detected within 200 m. In "strong surface ducting conditions," power-downs and shut-down would occur at 2000 m, 1000 m, and 500 m respectively. 71 Fed. Reg. 20998. These distances—though an improvement over the Navy's standard procedures—are plainly inadequate.

First, NMFS' safety zones are inconsistent with the agency's own 173 dB SEL threshold, which—under what the Navy represents as typical conditions—extends at least 1 km for a 1-second exposure and approximately 4 km for an 8-second exposure. RSPEA at C-17, C-22. In surface ducting conditions, NMFS' threshold appears capable of extending 5 km for a 1-second exposure. RSPEA at D-3 to D-8. While the Navy does not specify the number of animals significantly affected within various distances from the ship, its methodology suggests that number would grow geometrically (by the square of the radius) as one moves away from the ship, such that a safety zone set at 4 km (for example) could potentially result in 15 times' fewer takes than a safety zone set at 1 km. We are under no illusions concerning the Navy's ability to maintain any safety zone with a high rate of success, given the speed at which ships will be traveling; but a wider safety zone clearly holds potential to reduce impacts on marine mammals.

Second, NMFS' proposal fails to satisfy the MMPA's "least practicable impact" standard. Given that the Australian Navy has established a safety zone of 4000 yards

[11] The Navy is capable of reducing the source level of its standard tactical sonar, while in search mode, by at least 10 dB. See 71 Fed. Reg. 20998. Of course all possible power reductions should be considered.

for sonar systems operating at source levels well below 235 dB re 1 μPa, the burden must be on the Navy (and NMFS) to show why shut-down at that distance is impracticable.

In short, NMFS' distances are arbitrary and capricious even by the agency's own 173 dB energy threshold. If adopted, they would violate the MMPA's mitigation standard and would fail to help the agency meet the additional burdens it has taken on itself, in attempting to authorize the exercise through a rushed process.

2. Broader Area Shut-Down

In its draft authorization, NMFS fails to consider requiring shut-down or relocation of exercises under certain conditions that may occur outside the small safety zone around the array; yet this type of mitigation has been required or proposed in other authorizations. Most pointedly, NMFS recently required the U.S. Air Force to relocate its ordnance exercises offshore the Eglin Air Force Base should its fixed-wing aircraft spot any marine mammals or sea turtles within its orbit circle (comprising a radius of least 9.3 km). 71 Fed. Reg. 3475 (Jan. 23, 2006).[12] It is not evident why such a measure is practicable for the Air Force, but not for the Navy. In this case, the need to avoid significant impacts and serious injuries and mortalities only makes the measure more compelling. The Navy should be required to shut down or relocate should it detect beaked whales or aggregations of other species (particularly sperm whales and melon-headed whales) within its monitoring area.

3. Exercise Shut-Down

Presumably, as in previous authorizations, the exercise will be shut down if the Navy's take exceeds the permit's terms. As noted above, this measure cannot be used to evade authorization of serious injury or mortality under the MMPA. Kokechik Fishermen's Association, 839 F.2d at 801-02. Beyond this, however, the measures suffers from lack of clarity, making it difficult for the public to comment on what we know, from the 2004 mass stranding in Hanalei Bay, to be a critical provision in NMFS' authorization. NMFS must clarify (1) under what circumstances shut-down would occur, (2) how third-party observations would figure in that decision, and (3) whether shut-down would affect the immediate exercise (as in 2004) or the entire RIMPAC event. LaFlamme v. F.E.R.C., 852 F.2d 389, 398 (9th Cir. 1988). It is particularly important that its "Communications and Response Protocol" set clear, non-discretionary triggers for the suspension of RIMPAC 2006, given the considerable pressure decision-makers are likely to be under; that the decision to terminate the event is made by NMFS rather than the Navy; and that, considering the limits of NMFS' monitoring plan (Baird

[12] Further, the Minerals Management Service has proposed requiring airgun operators to shut-down their arrays should an aggregation of bowhead whales occur within the 120 dB isopleth. Minerals Management Service, Draft Programmatic Environmental Assessment: Arctic Ocean Outer Continental Shelf Seismic Surveys—2006, at 231 (2006).

Comment Letter at 5), third-party observations from whale-watch operators, independent researchers, and others are taken explicitly into account.

D. Choke-Point Exercises

NMFS cannot authorize the Navy's proposed choke-point exercises under an incidental harassment authorization. As discussed below, there is no dispute that tactical sonar can injure marine mammals and cause them to strand and die; and NMFS acknowledges that the risk of serious injury only intensifies "anytime either steep bathymetry, surface ducting conditions, or a constricted channel is present in addition to the operation of mid-frequency tactical sonar and the presence of cetaceans (especially beaked whales)." 71 Fed. Reg. 20995. The Navy's chokepoint exercises present four out of five conditions for heightened risk: (1) the use of tactical sonar (2) in places where as many as three species of beaked whales can occur, (3) areas with steep bathymetry (4) that offer surface ducting conditions. Id. Propped against this proven risk of injuries and mortalities is a monitoring plan whose efficacy amounts to speculation at best. See Found. for N. Am. Wild Sheep, 681 F.2d at 1179. Indeed, there is considerable evidence on record to indicate that the monitoring methods NMFS has proposed are completely inadequate to the task: detection rates of beaked whales and other cryptic species (whether through ship-based or aerial surveillance) are poor; conditions where the exercises would take place (e.g., the Alenuihaha Channel) are typically windy, making detection improbable; the proposed safety zone is small compared to the potential lethal impact zone for beaked whales and certain other species.[13] NMFS cannot issue an authorization to selectively cover only those takings that are (or might be) permissible under the MMPA. Kokechik Fishermen's Association, 839 F.2d at 801-02. If NMFS proceeds to authorize these three exercises, it will plainly have violated the law.[14]

E. Monitoring

The monitoring that NMFS would require for the vast majority of exercises (41 of 44) scheduled during RIMPAC 2006 consists of nothing more than a single, non-dedicated Navy observer, watching for marine mammals while performing other duties on deck. This

[13] See, e.g., J. Barlow and R. Gisiner, Mitigating, Monitoring, and Assessing the Effects of Anthropogenic Sound on Beaked Whales, 7 J. Cetacean Res. Manage. (2006, in press) (poor detection rates); Baird Comment Letter at 3-4 (poor monitoring conditions around Hawaii); International Whaling Commission, 2004 Report of the IWC Scientific Committee, Annex K at § 6.4 (2004), J. Hildebrand, K. Balcomb, and R. Gisiner, Modeling the Bahamas Beaked Whale Stranding of March 2000 (2004) (presentation given at the third plenary meeting of the U.S. Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals, 29 July 2004), D.S. Houser, R. Howard, and S. Ridgway, Can Diving-Induced Tissue Nitrogen Supersaturation Increase the Chance of Acoustically Driven Bubble Growth in Marine Mammals? 213 Journal of Theoretical Biology 183, 190 (2001), Southall et al., Hawaiian Melon-Headed Whale at 37-42, and RSPEA at D-3 to D-8 (indicating potential for serious injury, strandings, and mortality at isopleths of 160-165 dB and below).

[14] One alternative would allow the Navy to simulate choke-point scenarios within the Pacific Missile Range Facility.

level of monitoring is clearly inadequate. It is well established that single, non-dedicated observers—even if well-trained—spot only a fraction of the marine mammals that multiple, dedicated observers do.[15] And the exclusive focus on ship-based visual monitoring neglects several other methods, such as passive acoustic monitoring, that can boost effectiveness for some species. As it stands—given the fast pace of the Navy's exercises, the difficulty of spotting cryptic species on the surface, the typically windy conditions around Hawaii, the prevailing direction of currents, and the presence of scavengers—NMFS' monitoring plan is unlikely to detect unexpected impacts. Baird Comment Letter at 5. Not only does it fail to satisfy the MMPA's "least practicable impact" standard, but it also falls far short of ensuring "that no mortality or serious injury leading to mortality occurs." Cf. 71 Fed. Reg. 20997.

NMFS should consider adding the following monitoring methods, inter alia, in support of mitigation:

(1) Passive acoustic monitoring—Under the proposed authorization, passive acoustics would be required only of submarines using mid-frequency sonar; the only times surface ships might be compelled to use it are during periods of low visibility. 71 Fed. Reg. 20997, 20998. The Navy appears capable of passive monitoring through its submarines and range instrumentation (on the Pacific Missile Range Facility), and other platforms, such as autonomous hydrophones, could presumably be made available as well.[16] Given the presence in the exercise area of endangered sperm whales—a deep-diving species that is far easier to detect acoustically than visually—and other vocalizing species, NMFS should require the use of passive acoustic monitoring throughout RIMPAC.

(2) Suspension of acoustic exercises outside daylight hours and during periods of low visibility;[17]

(3) Use of at least two dedicated shipboard observers, as NMFS proposes for the Navy's choke-point exercises (71 Fed. Reg. 20999);

(2) Mandatory use of aerial surveys and ship-based surveys before, during, and after exercises, given their wide impact radius, the rapid speed of the Navy's vessels, and

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[15] C.J. Stone, The Effects of Seismic Activity on Marine Mammals in UK Waters, 1998-2000, at 34-35 (2003) (JNCC Report No. 323); Barlow and Gisiner, Mitigating, Monitoring, and Assessing, 7 J. Cetacean Res. Manage. in press.

[16] 71 Fed. Reg. 20997 (submarines); S. Jarvis and D. Moretti, Passive Detection and Localization of Transient Signals from Marine Mammals Using Widely Spaced Bottom Mounted Hydrophones in Open Ocean Environments, in Listening to Fish: Passive Acoustic Applications in Marine Fisheries—Conference Proceedings 109-21 (2002) (range instrumentation). See also Letter from Roger L. Gentry, Ph.D., to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy (Dec. 21, 2005) (recommending use of range instrumentation to track marine mammals on Navy's Undersea Warfare Training Range).

[17] Incredibly, NMFS does not even require nighttime suspension for the Navy's proposed choke-point exercises. Cf. 71 Fed. Reg. 20999.

the low probability of detecting injured or dead animals onshore (Baird Comment Letter at 5);

(3) Third-party monitoring, beyond the limited monitoring proposed for the choke-point exercises (71 Fed. Reg. 20999); and

(6) Establishment of a public "hotline" to report marine mammal strandings or other unusual behavior during the RIMPAC event, to be incorporated into the agencies' "Communications and Response Protocol" (71 Fed. Reg. 20999).

F. Long-Term Research

The Navy and NMFS are mandated, under the alternatives analysis provision of NEPA and the mitigation provision of the MMPA, to consider alternative sites for the RIMPAC exercise as well as geographic exclusions. NRDC v. Navy, 857 F.Supp. at 737-40. Toward this end, and following its own precedent in the SURTASS LFA authorization, NMFS should require the Navy to fund distribution and abundance and population research in the Hawaiian Operations Area and elsewhere, sufficient to support a meaningful geographic alternatives analysis for future RIMPAC exercises.[18] Given concerns about funding independence that have been expressed by some members of the marine mammal community—including the National Research Council—NMFS should require that monies be administered through an independent agent, such as the National Fish and Wildlife Foundation ("NFWF").[19] While such a program would not cure the agencies' legal violations in the present case, it makes those violations considerably less likely to recur.

G. Reductions in Activity

As noted below, the Navy's stated purpose in conducting RIMPAC is to "implement a selected set of exercises that is combined into a sea control/power projection fleet training exercise in a multi-threat environment," and to "demonstrate the ability of a multinational force to communicate and operate in simulated hostile scenarios." ." DSPEA at A-1 (FONSI for 2002 PEA); PEA at 1-2. Yet this summary statement does not sufficiently justify the precise number of exercises that have been proposed: that is, 44 antisubmarine warfare exercises, as opposed to 30 or 20. See, e.g., Simmons, 120 F.3d at 667. Given NMFS' manifest need, for all the reasons discussed above, to bring the Navy's takes

[18] In issuing the SURTASS LFA permit, NMFS relied for its determination in part on the Navy's commitment to a long-term research program, budgeted at $1 million per annum. 71 Fed. Reg. 46782.

[19] The 2000 National Research Council panel explicitly recommended that an agency with greater independence manage federal research on ocean noise, making the following observation: "Sponsors of research need to be aware that studies funded and led by one special interest are vulnerable to concerns about conflict of interest. For example, research on the effects of smoking funded by [the National Institutes of Health] is likely to be perceived to be more objective than research conducted by the tobacco industry." NRC, Marine Mammals and Low-Frequency Sound 84 (2000). See also L. Weilgart, H. Whitehead, L. Rendell, and J. Calambokidis, Signal-to-Noise: Funding Structure *Versus* Ethics as a Solution to Conflict-of-Interest: Response to 'Resonance and Dissonance: Science, Ethics, and the Sonar Debate,' Marine Mammal Science 20:898-899, 21 Marine Mammal Science 175-77 (2005).

unequivocally within the limits of NEPA and MMPA, it should require a substantial reduction in the number of sonar exercises.

II. NMFS' COMPLIANCE WITH THE MARINE MAMMAL PROTECTION ACT

The Marine Mammal Protection Act was adopted more than thirty years ago to ameliorate the consequences of human impacts on marine mammals. Its goal is to protect and promote the growth of marine mammal populations "to the greatest extent feasible commensurate with sound policies of resource management" and to "maintain the health and stability of the marine ecosystem." 16 U.S.C. § 1361(6). A careful approach to management was necessary given the vulnerable status of many of these populations (a substantial percentage of which remain endangered or depleted) as well as the difficulty of measuring the impacts of human activities on marine mammals in the wild. 16 U.S.C. § 1361(l), (3). "[I]t seems elementary common sense," the House Committee on Merchant Marine and Fisheries observed in sending the bill to the floor, "that legislation should be adopted to require that we act conservatively—that no steps should be taken regarding these animals that might prove to be adverse or even irreversible in their effects until more is known. As far as could be done, we have endeavored to build such a conservative bias into the [Marine Mammal Protection Act]." Report of the House Committee on Merchant Marines and Fisheries, reprinted in 1972 U.S. Code Cong. & Admin. News 4148.

The heart of the MMPA is its so-called "take" provision, a moratorium on the harassing, hunting, or killing of marine mammals. 16 U.S.C. § 1362(13). Under the law, NMFS may grant exceptions to the take prohibition, provided it determines, using the best available scientific evidence, that such take would have only a negligible impact on marine mammal populations or stocks. There are two types of general exemptions available through the MMPA for activities that incidentally "take" marine mammals: permits and incidental harassment authorizations. Until 1994, the only exemptions available under the Act were permits, which require the wildlife agencies to promulgate regulations specifying permissible methods of taking. In 1994, however, the MMPA was amended to provide a streamlined mechanism by which proponents, such as the Navy, can obtain authorization for projects whose takings are by incidental harassment only. 16 U.S.C. § 1371(a)(5)(D). Regardless of which process is used, NMFS must prescribe "methods" and "means of effecting the least practicable impact" on protected species as well as "requirements pertaining to the monitoring and reporting of such taking." 16 U.S.C. §§ 1371(a)(5)(A)(ii), (D)(vi).

As discussed above, NMFS' proposal fails in several ways to satisfy the MMPA's mitigation standard. But the authorization, if adopted, would violate the law in several other critical ways:

A. Incidental Harassment Authorization

As noted above, the streamlined process that Congress created, in 1994, for authorizing take of marine mammals applies only to activities that harass marine mammals, and not

those that can seriously injure or kill them. 16 U.S.C. § 1371(a)(5)(D)(i). NMFS admits that the sonar systems used in RIMPAC 2006 could cause mortalities and serious injury in marine mammals, especially beaked whales, yet it defends its decision to proceed under a harassment authorization on the grounds that the agency's mitigation and monitoring plan virtually eliminates the risk of death (71 Fed. Reg. 21002). Not only are these positions unsupported by any factual evidence in the authorization itself, they are flatly contradicted by numerous documents in the available record.

Beaked whales are considered a cryptic species, as they spend the vast majority of their time diving deep underwater, for periods regularly approaching one hour and sometimes exceeding 80 minutes. It is therefore difficult to sight them even under the most favorable conditions. According to the best available data, only 7% of Cuvier's beaked whales and 11% of Mesoplodon whales occurring directly on the trackline of an aerial survey are detected by trained biologists working in low sea states.[20] For ship-based surveys, the results are somewhat higher—some 23% of Cuvier's beaked whales and 45% of Mesoplodon whales occurring directly on the trackline are detected—but that assumes three dedicated biologists on task. Id. Because of the very different conditions that prevail, ship-based monitoring for mitigation purposes will detect fewer than 2% of beaked whales occurring directly on the trackline, and the probability detecting a whale even 1 km from the ship effectively drops to zero. Id. If anything, conditions for RIMPAC are unfavorable: as noted above, waters around the main Islands are typically windy,[21] particularly in some of the areas chosen for the Navy's choke-point exercises (Baird Comment Letter at 3-4), and vessels will be ranging over wide areas and traveling at high speeds.[22] Surveillance during the Navy's three choke-point exercises cannot overcome these problems, and its 41 other exercises would have only a single non-dedicated observer on board. The idea that NMFS' proposed monitoring scheme would prevent lethal exposures to beaked whales—which may be diving as a boat approaches at high speed—would therefore be insupportable even if those exposures occurred only within a kilometer of the vessel. But the best available scientific evidence indicates that mid-frequency sonar can cause beaked whale mortality out to the 160 dB isopleth and possibly beyond, an area that lies well outside the Navy's safety zone.[23]

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[20] Barlow and Gisiner, Mitigating, Monitoring, and Assessing, 7(3) J. Cetacean Res. Manage. (in press).

[21] J. Barlow, Cetacean Abundance in Hawaiian Waters, 22 Marine Mammal Science at 453 (reporting that less than 10% of the 17000 km surveyed took place in optimal conditions of Beaufort 2 or less).

[22] The shore-based surveillance proposed for some of the Navy's choke-point exercises are also problematic. See Baird Comment Letter at 3-4.

[23] International Whaling Commission, 2004 Report of the IWC Scientific Committee, Annex K at § 6.3 (2004); K.C. Balcomb and D.E. Claridge, A Mass Stranding of Cetaceans Caused by Naval Sonar in the Bahamas, 8(2) Bahamas Journal of Science 1 (2001); Hildebrand et al., Modeling the Bahamas Beaked Whale Stranding; Houser et al., Can Diving-Induced Tissue Nitrogen Supersaturation, 213 Journal of Theoretical Biology at 190). See also Southall et al., Hawaiian Melon-Headed Whale at 37-42; RSPEA at D-3 to D-9; 71 Fed. Reg. 20990.

NMFS ties itself in knots, trying to avoid the conclusion that marine mammals may die. Equivocating at first, it proposes that all beaked whale impacts would be counted as non-lethal "Level A" injury rather than as serious injury and mortality (71 Fed. Reg. 20995); by the end, it has denied that any "Level A" injury would occur (71 Fed. Reg. 21002). The agency offers no basis for concluding that all of these injuries would amount to "Level A" harassment; indeed, such a conclusion runs counter to the strandings record and the prevailing literature, which NMFS acknowledges in its notice. 71 Fed. Reg. 20994.[24] The inconsistencies within the proposed authorization (and the RSPEA) underscore what has happened here: a post-hoc rationalization to justify use of an inappropriate process. See Kokechik Fishermen's Association, 839 F.2d at 801-02.[25]

B. Negligible Impact

NMFS can authorize exceptions to the take moratorium only upon making an affirmative finding that an activity will have no more than a "negligible impact" on a species or stock. 16 U.S.C. §§ 1371(a)(5)(A)(i), (D)(i)(I). "Negligible impact" has been further defined by the agency as one "that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species of stock through effects on annual rates of recruitment or survival" (50 C.F.R. § 216.103); or, as the agency translates, one that is "not likely to reduce annual rates of adult survival or recruitment" (71 Fed. Reg. 21003). In its proposed authorization, NMFS argues repeatedly that, based on its analysis of "the behavioral disturbance levels in comparison to the overall population" and on the mitigation measures it has proposed, RIMPAC exercises would have no more than a negligible impact on Hawaii's marine mammal populations. 71 Fed. Reg. 20996, 20999, 21002, 21003. But for numerous reasons it has no basis to make the affirmative determination that is required.

1. Beaked whales[26]

NMFS has no basis to determine that impacts on beaked whales would be negligible. The Navy, in its RSPEA, counts each beaked whale take as a non-lethal injury. Even if one puts aside, for the moment, the impropriety of converting a record of severe injuries, strandings, and mortalities into recoverable damage, the sheer number of calculated injuries (more than 3000 between three species, affecting over 16% of each population, 71 Fed. Reg. 20989) begs the question, at the very least, of whether an effect on the stocks' survival or reproduction has occurred. It seems likely that these numbers are what prompted NMFS to change its mind and conclude that its mitigation plan would preclude even the "Level A" injuries that it earlier said it would count. 71 Fed. Reg. 20995, 21002. Again, we note that NMFS cannot rely on unsupported statements about mitigation, particularly those that contradict the established record, to

[24] For a partial list of relevant literature, see the section below on the "Injury Threshold" and the section of NRDC's DEIS Comment Letter on "Strandings and Mortalities Associated with Mid-Frequency Sonar."

[25] Many of these points apply to certain other species, such as melon-headed whales, for which there is a proven risk of mortality.

[26] Many of these points may also apply to other species, such as melon-headed whales.

support a negligible impact determination. See, e.g., Nat'l Parks & Conservation Ass'n, 241 F.3d 722 at 733-35.

2. Other populations

Nor can NMFS make a negligible impact determination for other populations. Even accepting the Navy's analysis, the percentages of stocks and populations taken are extraordinarily high and do not bear out a conclusion of negligible impact. For example, the Navy estimates that as many as 38% of Hawaii's fin whales (which are endangered), 51% of its false killer whales (which are considered a strategic stock under the MMPA),[27] and (effectively) 100% of its spinner dolphins would be taken. Even adjusting by 16% (as NMFS requires to account for multiple exposures of individual animals, 71 Fed. Reg. 21002), the percentages remain high, comprising some 31% of fin whales, 42% of false killer whales, and 86% of spinner dolphins. By comparison, it has been recognized that harassment of more than 12% of at least very small populations "could have a serious impact, affecting their reproduction and survival." NRDC v. Evans, 279 F.Supp.2d at 1158 (requiring enhancement of Navy's mitigation measures for sonar system, beyond 12nm coastal exclusion zone and tripartite monitoring measures). As with beaked whales, these levels of take beg the question of whether negligible impacts would occur—a question that cannot be answered with mere speculation.[28]

To make matters worse, the Navy's numbers do not take account of the best scientific evidence on local population structure, which indicates that some marine mammal populations (at least short-finned pilot whales, false killer whales, bottlenose dolphins, and spinner dolphins, and potentially others) around the main Hawaiian islands are reproductively distinct from conspecifics in the tropical Pacific.[29] As a result, the Navy

[27] J.C. Carretta, K.A. Forney, MM. Muto, J. Barlow, J. Baker, B. Hanson, and M.S. Lowry, U.S. Pacific Marine Mammal Stock Assessments: 2005 at 227-31 (2006).

[28] For example, while NMFS acknowledges that stressful sounds can suppress pre-ovulatory luteinizing hormones and thus inhibit reproduction, it dismisses the possibility of population-level impacts on the mere suggestion that some animals within a species will be more sensitive to stress than others. 71 Fed. Reg. 20999.

[29] K.R. Andrews, L. Karczmarski, W.W.L. Au, S.H. Rickards, C.A. Vanderlip, and R.J. Toonen, Patterns of Genetic Diversity of the Hawaiian Spinner Dolphin (Stenella longirostris), Atoll Research Bulletin (2006, in press); R.W. Baird, A.M. Gorgone, A.D. Ligon, and S.K. Hooker, Mark-Recapture Abundance Estimate of Bottlenose Dolphins (Tursiops truncatus) Around Maui and Lanai, Hawaii, During the Winter of 2000/2001 (2001) (report prepared for NMFS under Contract #40JGNF000262); R.W. Baird, A.M. Gorgone, and D.L. Webster, An Examination of Movements of Bottlenose Dolphins between Islands in the Hawaiian Island Chain (2002) (report prepared for NMFS under Contract #40JGNF110270); R.W. Baird, D.J. McSweeney, D.L. Webster, A.M. Gorgone, and A.D. Ligon, Studies of Odontocete Population Structure in Hawaiian Waters: Results of a Survey through the Main Hawaiian Islands in May and June 2003 (2003) (report prepared for NMFS under Contract #AB133F-02-CN-0106); R.W. Baird, G.S. Schorr, D.L. Webster, S.D. Mahaffy, A.B. Douglas, A.M. Gorgone, and D.J. McSweeney, A Survey for Odontocete Cetaceans off Kaua'i and Ni'ihau, Hawai'i, during October and November 2005: Evidence for Population Structure and Site Fidelity (2006) (report prepared for NMFS under Order #AB133F05SE5197); S.J. Chivers, R.G. LeDuc, and R.W. Baird, "Hawaiian Island Populations of False Killer Whales and Short-Finned Pilot Whales Revealed

has significantly overestimated the size of these populations and significantly underestimated the percentages that would be taken. Baird Comment Letter at 2-3.

3. General

As discussed below in the section on NEPA compliance, the Navy's impact assessment—particularly its thresholds and modeling—runs counter to the best available scientific evidence, and NMFS has no grounds for supposing, as it does (71 Fed. Reg. 20996) that the Navy's take numbers are overestimated. One of the most glaring errors in the Navy's model is its treatment of cumulative impacts: for not only does the Navy (as discussed above) fail to address the problem of high take levels with anything other than speculation, it also fails (as discussed below) to tabulate cumulative takes from future RIMPAC exercises or even from other elements of the RIMPAC 2006 event. Given this major defect, it is illegal for NMFS to determine that the application submitted by the Navy is "complete" and that it includes "sufficient information… regarding the environmental impact of the proposed activity" (50 C.F.R. §§ 216.33(c)(2)(i), (v)). For all these reasons, NMFS cannot make an affirmative finding of negligible impact.

C. Scope of Authorization

It is established that NMFS cannot selectively authorize only some of the marine mammal takes resulting from an activity, while letting other foreseeable takes occur under civil penalty. Kokechik Fisherman's Association, 839 F.2d at 801-02. Yet here the agency, in its review of RIMPAC 2006, proposes to authorize only those takes that are directly attributable to the Navy's antisubmarine warfare exercises, leaving aside reasonably foreseeable impacts from a host of other RIMPAC activities: Air-to-Surface Missile Exercises (ASMEX), Surface-to-Air Missile Exercises (SAMEX), Surface-to-Surface Missile Exercises (SSMEX), Mine Countermeasures (MCM) Exercises, Strike Warfare Exercises (STWEX), Gunnery Exercises (GUNNEX), Sinking Exercise (SINKEX), and others. RSPEA at 2-3. These activities are closely interwoven with the sonar exercises under consideration and are not severable from them: they involve the same actor, the same populations of animals, the same planning process, and the same NEPA documentation prepared under the same programmatic review; and many of them (such as those using ordnance) have potential for acoustic impacts as well. See 42 C.F.R. 1508.18. Furthermore, at least some of them, such as Navy's Gunnery Exercises, appear similar or identical to military activity that has required authorization and substantial mitigation in the past. See, e.g., 71 Fed. Reg. 3474, 3474-3484 (authorization of gunnery exercises off Eglin Air Force Base). Should the Navy conduct any of those exercises without a permit, it would be acting in violation of the MMPA; and NMFS would be in violation both for

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by Genetic Analyses," in Abstracts of the 15th Biennial Conference on the Biology of Marine Mammals, 14-19 December 2003, Greensboro, North Carolina 32 (2003); K. Martien, R.W. Baird, and K. Robertson, Population Structure of Bottlenose Dolphins around the Main Hawaiian Islands (2005) (paper presented to the Pacific Scientific Review Group, January 2005).

selectively authorizing take and for illegally determining that the Navy's application was complete. 50 C.F.R. §§ 216.33(c)(2)(i).

III. NMFS' COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

Enacted by Congress in 1969, NEPA establishes a national policy to "encourage productive and enjoyable harmony between man and his environment" and "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." 42 U.S.C. § 4321. In order to achieve its broad goals, NEPA mandates that "to the fullest extent possible" the "policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with [NEPA]." 42 U.S.C. § 4332. As the Supreme Court explained,

> NEPA's instruction that all federal agencies comply with the impact statement requirement – and with all the requirements of § 102 – "to the fullest extent possible" [cit. omit.] is neither accidental nor hyperbolic. Rather the phrase is a deliberate command that the duty NEPA imposes upon the agencies to consider environmental factors not be shunted aside in the bureaucratic shuffle.

Flint Ridge Development Co. v. Scenic Rivers Ass'n, 426 U.S. 776, 787 (1976).

Central to NEPA is its requirement that, before any federal action that "may significantly degrade some human environmental factor" can be undertaken, agencies must prepare an environmental impact statement. Steamboaters v. F.E.R.C., 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original). The fundamental purpose of an EIS is to force the decision-maker to take a "hard look" at a particular action – at the agency's need for it, at the environmental consequences it will have, and at more environmentally benign alternatives that may substitute for it – before the decision to proceed is made. 40 C.F.R. §§ 1500.1(b), 1502.1; Baltimore Gas & Electric v. NRDC, 462 U.S. 87, 97 (1983). The law is clear that the EIS must be a pre-decisional, objective, rigorous, and neutral document, not a work of advocacy to justify an outcome that has been foreordained.

In nearly every respect, the Navy's RSPEA fails to meet the high standards of rigor and objectivity established under NEPA, and NMFS would violate the law in adopting it.[30]

A. Finding of No Significant Impact

NMFS proposes to authorize the Navy's marine mammal "takes" under an environmental assessment rather than under an environmental impact statement. This position is simply

[30] The following section addresses some of the major violations inherent in NMFS' adoption of the Navy's RSPEA. For a more exhaustive treatment, see our comment letter on the Navy's draft SPEA. Letter from Joel R. Reynolds and Michael D. Jasny, NRDC, to Commander, U.S. Pacific Fleet, Navy [hereinafter "NRDC Comment Letter"] at 6-57 (February 21, 2006). Our February 2006 comment letter is hereby incorporated by reference.

inconsistent with the requirements of NEPA. As noticed above, NEPA requires federal agencies to prepare an EIS for any major federal action "significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). Significant effects need not be certain to occur to trigger the EIS requirement—rather, "an EIS must be prepared if 'substantial questions are raised as to whether a project . . . may cause significant degradation of some human environmental factor.'" Idaho Sporting Congress v. Thomas, 137 F.3d 1146, 1149 (9th Cir. 1998) (quoting Greenpeace Action v. Franklin, 14 F.3d 1324, 1332 (9th Cir. 1992).

The Council on Environmental Quality ("CEQ") has enacted regulations to ensure compliance with NEPA. These regulations "are binding on all federal agencies and provide guidance to the courts for interpreting NEPA requirements." Or. Natural Res. Council v. United States Forest Serv., 834 F.2d 842, 847 n. 5 (9th Cir. 1987). In determining whether a proposed action "significantly" affects the environment and thus requires an EIS, CEQ regulations lay out ten factors for federal agencies to consider. 40 C.F.R. § 1508.27(b). Any one of these factors, standing alone, is sufficient to require preparation of an EIS. Ocean Advocates v. United States Army Corps of Eng'rs, 402 F.3d 846, 865 (9th Cir. 2005). In this case, at least the following seven factors strongly suggest that preparation of an EIS is required:

> (1) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
>
> (2) The degree to which the effects on the quality of the human environment are likely to be highly controversial;[31]
>
> (3) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks;
>
> (4) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration;[32]

[31] Aside from the public comments submitted on RIMPAC and on the Navy's Undersea Warfare Training Range off North Carolina, see, e.g., Marc Kaufman, Whales' Plight Revives Sonar Theory, Washington Post, July 11, 2004 at A1; Jan TenBruggencate in Whale Dies after Pod Returns to Sea, Honolulu Advertiser, July 7, 2004; Marc Kaufman, Sonar Used before Whales Hit Shore, Aug. 31, 2004 at A3; William Cole, Sonar "Likely" Factor in Stranding, Honolulu Advertiser, Apr. 28, 2006; Audrey McAvoy, Sonar May Be Linked to Stranding of Whales, AP Wire, Apr. 28, 2006 (picked up by over 100 news outlets domestically and internationally); Marc Kaufman, Sonar Called Likely Stranding Cause, Washington Post, Apr. 28, 2006; Editorial, Move Sonar Exercises to Low-Risk Waters, Honolulu Star-Bulletin, May 1, 2006; Lester Chang, Battle Lines Drawn over Use of Sonar, The Garden Island, Apr. 30, 2006; Telecast, Good Morning Hawaii, KITV-Honolulu, May 23, 2006 (reporting on protest of RIMPAC led by Pacific Whale Foundation); Letters to Editor, Maui News, May 22, 2006 (containing two letters to the editor opposing RIMPAC).

> (5) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts;
>
> (6) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973; and
>
> (7) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

42 C.F.R. § 1508.27. It should be clear, under this rubric, that RIMPAC presents the potential for significant adverse impacts on the marine environment. NMFS cannot authorize the exercise absent a full EIS.

B. Statement of Purpose and Need

It is a fundamental requirement of NEPA that agencies preparing an EIS specify their project's "purpose and need." 40 C.F.R. § 1502.13. Not any statement of purpose and need will suffice: "An agency cannot define its objectives in unreasonably narrow terms" so as to exclude consideration of reasonable alternatives. City of Carmel-by-the-Sea v. United States Dep't of Transp., 123 F.3d 1142, 1155 (9th Cir. 1997) (citing Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 196 (D.C. Cir. 1991)). Instead, the statement must reflect the agency's core aim without foreclosing reasonable alternatives. Id.

Here, the Navy's stated purpose is "to implement a selected set of exercises that is combined into a sea control/power projection fleet training exercise in a multi-threat environment," and to "demonstrate the ability of a multinational force to communicate and operate in simulated hostile scenarios." RSPEA at A-1 (FONSI for 2002 PEA); PEA at 1-2. These statements contain no language that would justify the narrow alternatives analysis that the Navy performs in its 2002 Programmatic EA and in the supplemental documents that depend on it.[33] As the language is somewhat opaque, however, we would remind the Navy that its statement of purpose must allow meaningful review. "The existence of a viable but unexamined alternative renders an environmental impact statement inadequate," Idaho Conservation League v. Mumma, 956 F.2d 1508, 1519 (9th Cir. 1992), and an EIS

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[32] See Letter from B.J. Penn, Assistant Secretary of the Navy, to Conrad C. Lautenbacher, Jr., NOAA Administrator, at 2-3 (Aug. 5, 2005); Letter from Conrad C. Lautenbacher, Jr., NOAA Administrator, to B.J. Penn, Assistant Secretary of the Navy, at 1 (Aug. 22, 2005).

[33] The inadequacy of the Navy's alternatives analysis is discussed below at section II(G).

(or EA) errs when it accepts "as a given" parameters that it should have studied and weighed. Simmons, 120 F.3d 664, 667 (7th Cir. 1997).

C. Alternatives Analysis

At bottom, an EIS must "inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. This requirement has been described in regulation as "the heart of the environmental impact statement." Id. § 1502.14. The agency must therefore "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Id. § 1502.14(a). Consideration of alternatives is required by (and must conform to the independent terms of) both sections 102(2)(C) and 102(2)(E) of NEPA.

Here the Navy considers three alternatives for review: the proposed action, the proposed action "as limited to previously analyzed locations and activities," and the no-action alternative. RSPEA at 2-12. There are at least three broad problems, however, with this approach.

First, the Navy's failure to meaningfully consider more than just the "No-Action" alternative (DSPEA at 2-12) is plainly illegal under NEPA. 40 C.F.R. §1502.14. Here the Navy's last-minute addition, the proposed action "as limited to previously analyzed locations and activities," is effectively identical to the proposed action, for while it addresses the relocation of the Non-Combatant Evacuation Operation (a minor issue that occupies all of one-and-one-pages of analysis), it does not propose any alternatives for the antisubmarine warfare exercises that are virtually the exclusive focus of the Navy's supplemental EA. An agency cannot limit its analysis to alternatives that skew its decision or lead effectively to the desired result. See, e.g., California v. Block, 690 F.2d 753, 768 (9th Cir. 1982); NRDC v. Evans, 279 F.Supp.2d 1129, 1664-66 (9th Cir. 2003); Massachusetts v. Clark, 594 F. Supp. 1373 (D. Mass. 1984). Yet that is precisely what the Navy has done here.

Second, the Navy fails to consider alternative sites for RIMPAC, either within the existing Hawaiian Islands Operating Area or in another location. Indeed, the Navy provides absolutely no rationale in any of its NEPA documents for why the exercise must be conducted precisely where and when it says.[34] Yet avoiding concentrations of vulnerable and endangered species and high abundances of marine life is perhaps the most critical step the Navy can take in reducing impacts, and a "hard look" at geographical alternatives is plainly required by NEPA and other laws. NRDC v. Evans, 279 F.Supp.2d at 1664-66;

[34] It is worth noting, in any case, that factors of mere convenience and cost alone cannot dictate an agency's choice of alternatives to evaluate in an EIS. An agency must discuss all reasonable alternatives—those that will accomplish the purpose and need of the agency and are practical and feasible—not simply those it finds most convenient. 40 C.F.R. § 1502.14.

NRDC v. Navy, 857 F.Supp. at 734. Because the Navy has failed to undertake an alternatives analysis that allows it to make an informed siting choice, the RSPEA and its predecessors are fundamentally inadequate.

Third, even aside from the omission of reasonable alternative locations, the Navy fails to consider alternatives of any other kind. RSPEA at 2-13. While the question of proper siting is crucial, it is not the only factor that must be considered in identifying other, less harmful ways to fulfill the Navy's purpose. Indeed, it appears that many reasonable alternatives—beginning with the mitigation measures that NMFS has proposed—are missing from the Navy's analysis that might fulfill that purpose while reducing harm to marine life and coastal resources. Many such measures are employed by other countries in their sonar exercises and even by the U.S. Navy in other contexts; and there are many others that should be considered, many of which are discussed in the mitigation section above. Such measures are reasonable means of reducing harm to marine life and other resources on the proposed range, and their omission from the alternatives analysis renders that analysis inadequate.[35]

In sum, the RSPEA omits from its analysis reasonable alternatives—with regard to both the siting of the range and other operational choices—that might achieve the Navy's core aim while minimizing environmental harm. These omissions are all the more unreasonable given the long period during which the Navy has worked on this document and its predecessors. For these reasons, we urge NMFS not to adopt the alternatives analysis in the Navy's RSPEA. 40 C.F.R. § 1502.1.

D. Scope of Review

Although it calls its document a Supplemental Programmatic Environmental Assessment, the Navy suggests at points that its analysis of "extraterritorial" activities, those activities that would take place outside U.S. territorial waters, was prepared under the authority of Executive Order 12114 rather than under NEPA. RSPEA at 3-4. The Navy's position on the scope of review is inconsistent with the statute. See, e.g., Environmental Defense Fund v. Massey, 968 F.2d 528 (D.C. Cir. 1994) and NRDC v. Navy, No. CV-01-07781, 2002 WL 32095131 at *9-12 (C.D. Cal. Sept. 19, 2002). For NMFS, adopting such a position is clearly insupportable, given inter alia that the federal action to which its NEPA review applies, the decision to authorize RIMPAC 2006, takes place entirely within the territory of the United States. NMFS should indicate its derogation from the Navy's RSPEA on this point.

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[35] In this respect, the RSPEA stands in contrast to a Draft Supplemental EIS recently published by the Navy analyzing the use of another type of high-intensity active sonar known as SURTASS LFA (or LFA). See Navy, Draft Supplemental Environmental Impact Statement for SURTASS LFA Sonar (2005). That Draft EIS analyzes five alternatives and includes, within those alternatives, consideration of a variety of mitigation measures for the use of LFA sonar, including seasonal variations, visual monitoring for marine mammals and sea turtles, passive acoustic monitoring for marine mammals, active acoustic monitoring, and shutdown procedures. Id. at 2-10 to 2-14.

E. Impact Assessment

Fundamental to satisfying NEPA's requirement of fair and objective review, agencies must ensure the "professional integrity, including scientific integrity," of the discussions and analyses that appear in environmental impact statements. 40 C.F.R. § 1502.24. To this end, they must make every attempt to obtain and disclose data necessary to their analysis. The simple assertion that "no information exists" will not suffice; unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. See 40 C.F.R. § 1502.22(a). Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community." 40 C.F.R. §§ 1502.22(2), (4), 1502.24. Such requirements become acutely important in cases where, as here, so much about a program's impacts depend on newly emerging science. Finally, and crucially, the law requires agencies to evaluate all "reasonably foreseeable" impacts. 42 C.F.R. § 1502.22.

In this case, the Navy's assessment of impacts on marine mammals is consistently undermined by its failure to meet these fundamental responsibilities of scientific integrity, methodology, investigation, and disclosure. NMFS has insisted on lowering the Navy's threshold for significant behavioral change and notes several times, in its proposed authorization, that its adoption of the Navy's analysis is sui generis—in some respect an appropriate response, given the inadequate time for review. Yet the agency appears to endorse some elements of the Navy's analysis without qualification, and it proposes to adopt the RSPEA as its own NEPA document in approving the Navy's request. In this, NMFS, too, would violate the law.

1. Thresholds of Injury, Hearing Loss, and Significant Behavioral Change

At the core of the agencies' assessment of acoustic impacts are the thresholds they have established for physical injury, hearing loss, and significant behavioral harassment, the levels above which meaningful effects on marine mammals are found to occur. Previous environmental reviews of non-impulsive sources of sound have generally calibrated these thresholds to sound pressure levels, or SPLs, the amount of pressure received by a marine animal at a discrete moment in time, usually the duration of a sound wave. For the Navy's new wave of environmental reviews, it has used a somewhat different measurement: energy flux density level, or "EL," which integrates the amount of energy flowing through an area over time. In theory, the use of ELs (at least as a supplement to sound-pressure levels) has merit, but there are gross problems with their application here. We strongly recommend that NMFS qualify its support of the Navy's impact thresholds.

a. Injury Threshold

The Navy fixes its highest threshold of 215 dB re 1 μPa^{2}•s—which it considers the ground floor for physical injury—on the amount of energy necessary to induce permanent hearing loss (or "threshold shift") in marine mammals. Beneath this decision lies an assumption that the tissues of the ear are "the most susceptible to the physiological effects of sound," and, indeed, a few paragraphs from a related environmental review are spent in an effort to set aside other types of injury that have been identified or observed.[36] In its proposed authorization, however, NMFS pointedly disagrees with the Navy's position. As NMFS observes, "some marine mammals may react to mid-frequency sonar, at received levels lower than those thought to cause direct physical harm, with behaviors that may, in some circumstances, lead to physiological harm, stranding, or, potentially, death." 71 Fed. Reg. 20990. Yet NMFS proposes to adopt the Navy's threshold for injury, relying in part on an unsubstantiated claim about its monitoring plan (see the section below on "Incidental Harassment Authorization"). For this and other reasons, its action would be arbitrary and capricious.

First, the RSPEA disregards data gained from actual whale mortalities. The best available scientific evidence, as reported by the IWC's Scientific Committee, indicates that the whales beached in the Bahamas stranding were exposed to no more than 160-65 dB re 1 μPa of mid-frequency sonar for 30 seconds.[37] A further modeling effort, undertaken in part by the Office of Naval Research, suggests that the mean exposure level of beaked whales, given their likely distribution in the Bahamas' Providence Channels, was lower than 140 dB re 1 μPa.[38] Factoring in duration, then, evidence of actual sonar-related mortalities would compel an EL no greater than 174 dB re 1 μPa^{2}•s, at least for some beaked whales, and possibly much lower. A recent tagging study has found that Cuvier's beaked whales disrupt their dives in response to shipping noise at 136 dB (or 160 dB re 1 μPa^{2}•s), and sonar is likely to affect the species more acutely.[39]

Second, the Navy—and NMFS, in its proposed authorization—fail to take proper account of published research on bubble growth in marine mammals, which separately indicates the potential for injury and death at levels far lower than the Navy proposes. According to a series of published, peer-reviewed articles (based both on accepted theoretical methods and on experimental research), gas bubbles

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[36] Navy, Draft Overseas Environmental Impact Statement/ Environmental Impact Statement Undersea Warfare Training Range [hereinafter "DEIS"] 4.3-8 (2005). As has been noted, impact thresholds for the RIMPAC threshold were originally developed by the Navy for its east-coast Undersea Warfare Training Range; and, indeed, by way of explaining its methodology for RIMPAC, the Navy explicitly refers the reader to the DEIS it prepared for the east-coast range. RSPEA at C-1. Accordingly, the NEPA section of this comment letter will frequently make reference to pages in the Navy's DEIS.

[37] International Whaling Commission, 2004 Report of the Scientific Committee, Annex K at § 6.3.

[38] Hildebrand et al., Modeling the Bahamas Beaked Whale Stranding of March 2000.

[39] Letter from Natacha Aguilar Soto, La Laguna University, Canary Islands, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy at 3-4 (Jan. 27, 2006) (citing work in press).

could be activated in supersaturated marine mammal tissue on brief exposure to sounds of 150 dB (RMS) re 1 μPa or lower and then grow significantly, causing injury, as the animal rises toward the surface.[40] That work is supported by a number of other studies, also published in leading, peer-reviewed journals, demonstrating through anatomical evidence that in vivo bubble growth can occur in a variety of marine mammal species, from sperm whales to beaked whales to Risso's dolphins.[41] And this is not even to mention the investigation of the 2002 Canary Islands strandings, whose findings concerning fat and gas emboli were recently published at length in another major journal.[42] NMFS argues, in its avoidance of the issue, that the evidence supporting bubble growth is debatable and that the theory therefore deserves "no special treatment" (71 Fed. Reg. 20991); but this characterization simply elides the numerous published, peer-reviewed papers—in dive behavior, veterinary pathology, and molecular biology—that support it, and disregards the recognition bubble growth has received from expert panels, such as the one convened in 2004 by the Marine Mammal Commission to review sonar-related strandings.[43]

In any case, the law requires agencies to evaluate all "reasonably foreseeable" impacts, which, by definition, includes "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." 42 C.F.R. § 1502.22. The scientific literature supporting bubble growth rises far above this standard, and the Navy's failure to incorporate it into its impact model is arbitrary and capricious.

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[40] D. Houser, Can Diving-Induced Tissue Nitrogen Supersaturation, 213 Journal of Theoretical Biology at 190; L.A. Crum, M.R. Bailey, J. Guan, P.R. Hilmo, S.G. Kargl, T.J. Matula, and O.A. Sapozhnikov, Monitoring Bubble Growth in Supersaturated Blood and Tissue ex vivo and the Relevance to Marine Mammal Bioeffects, 6(3) Acoustics Research Letters Online 214 (2005) See also J.R. Potter, A Possible Mechanism for Acoustic Triggering of Decompression Sickness Symptoms in Deep-Diving Marine Mammals (paper presented at the IEEE International Symposium on Underwater Technology 2004, Taipei, Taiwan, April 2004).

[41] M.J. Moore and G.A. Early, Cumulative Sperm Whale Bone Damage and the Bends, 306 Science 2215 (2004); P.D. Jepson, R. Deaville, I.A.P. Patterson, A.M. Pocknell, H.M. Ross, J.R. Baker, F.E. Howie, R.J. Reid, A. Colloff, and A.A. Cunningham, Acute and Chronic Gas Bubble Lesions in Cetaceans Stranded in the United Kingdom, 42 Veterinary Pathology 291 (2005).

[42] A. Fernández, J.F. Edwards, F. Rodríguez, A. Espinosa de los Monteros, P. Herráez, P. Castro, J.R. Jaber, V. Martín, & M. Arbelo, 'Gas and Fat Embolic Syndrome' Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals, 42 Veterinary Pathology 446 (2005).

[43] T.M. Cox, T.J. Ragen, A.J. Read, E. Vos, R.W. Baird, K. Balcomb, J. Barlow, J. Caldwell, T. Cranford, L. Crum, A. D'Amico, G. D'Spain, A. Fernández, J. Finneran, R. Gentry, W. Gerth, F. Gulland, J. Hildebrand, D. Houser, T. Hullar, P.D. Jepson, D. Ketten, C.D. MacLeod, P. Miller, S. Moore, D. Mountain, D. Palka, P. Ponganis, S. Rommel, T. Rowles, B. Taylor, P. Tyack, D. Wartzok, R. Gisiner, J. Mead, & L. Benner, Report of a Workshop to Understand the Impacts of Anthropogenic Sound on Beaked Whales 2 (in press) (noting particular plausibility of gas-bubble disease as one of 2 major findings of workshop).

Third, the numbers do not reflect other non-auditory physiological impacts, as from stress and from chronic exposure during development, which are discussed further among "Other Impacts on Marine Mammals" (below).

Fourth, the Navy's exclusive reliance on energy flux density as its unit of analysis does not take other potentially relevant acoustic characteristics into account. For example, an expert group commissioned by the Office of Naval Research in 2003 to provide recommendations on mitigation suggested that peak power may matter more to beaked whale mortalities than integrated energy.[44] Reflecting this uncertainty, the Navy should establish a dual threshold for marine mammal injury.

Fifth, the Navy's threshold is called into question by a white paper generated and heavily relied on by the Navy in its environmental review of SURTASS LFA. That paper summarized the results of tests on small terrestrial mammals that had been submerged just beneath the water surface and exposed to low-frequency sound. According to those tests, resonance damage could occur on exposure to 5 minutes of sound of 180 dB re 1 μPa (or approximately 205 dB re 1 μPa^{2}•s), and the "onset" of transluminal damage and tissue shearing at 190 dB re 1 μPa (duration is not indicated).[45] It was on this basis that the Navy established a 180 dB sound-pressure threshold for injury for the LFA system. The DSPEA gives no consideration as to whether mid-frequency sound might produce the same results, and no indication why it is not therefore, on this basis alone, setting the EL at 205 dB re 1 μPa^{2}•s or below. Cf. DEIS at 4.3-20 to 21.

b. Temporary Hearing Loss Threshold

The RSPEA sets its threshold for temporary hearing loss, or "threshold shift" ("TTS"), at 195 dB re 1 μPa^{2}•s. RSPEA at 4-4. It bases this threshold on a synthesis of studies on two species of cetaceans, bottlenose dolphins and beluga whales, conducted by the Navy's SPAWAR laboratory in San Diego and by researchers at the University of Hawaii. DEIS at 4.3-12 to 15.

First, the Navy's extrapolation of data from bottlenose dolphins and belugas to all cetaceans is not justifiable. Given the close association between acoustic sensitivity and threshold shift, such an approach must presumes that belugas and bottlenose dolphins have the best hearing sensitivity in the mid-frequencies of any cetacean. Yet, harbor porpoises and orcas (for example) are more sensitive over part of the mid-frequency range than are the two species in the SPAWAR and Hawaii studies.[46] Indeed, bottlenose dolphins may be precisely the wrong species to use as

[44] H. Levine, Active Sonar Waveform 27 (2004) (JASON Group Rep. JSR-03-200).

[45] E. Cudahy and W.T. Ellison, A Review of the Potential for in vivo Tissue Damage by Exposure to Underwater Sound (2002) (forwarded to Chief of Naval Operations by Naval Submarine Medical Research Laboratory on Mar. 12, 2002).

[46] Richardson et al., Marine Mammals and Noise at 209.

an indicator species, as some recent studies suggest they may possess gain-control mechanisms while other species, like beaked whales, do not.[47] Finally, the animals in the studies may not represent the full range of variation even within their own species, particularly given their age and situation (the SPAWAR animals, for example, are housed in a noisy bay and the bottlenose dolphins have varying degrees of hearing loss).[48]

Second, the small size of the data set generated by the studies leads the Navy and NMFS to some arbitrary interpretations. For example, the Navy effectively excludes the results of one study that found threshold shift originating in a bottlenose dolphin at 190 re 1 μPa^{2}•s, which is a full 5 dB re 1 μPa^{2}•s below its proposed standard. DEIS at 4.3-12 to 13. The basis for this exclusion is the equal energy hypothesis: if you assume that the threshold for hearing loss decreases by a constant amount as the duration of a sound increases, you can fit a straight line connecting the data points that the studies have produced. Yet where the line falls can remain somewhat arbitrary given the small number of points on the chart. In this case, the Navy relied for its line-drawing on a single data point, from a single subject, lying at a distance from the main data cluster (Nachtigall et al. 2003b); alternatively, it might have dropped the line about 5 dB lower, which would have brought it closer to a second cluster, made of multiple data points from multiple subjects. See DEIS at Fig. 4.3-5. That choice would have fit the data just as well (or better) and would have had the advantage of being marginally more conservative—[49] yet there is no justification in the Navy's USWTR DEIS for the choice it made. The RSPEA's assumption of a 195 re 1 μPa^{2}•s threshold is arbitrary and capricious.

Third, in its USWTR DEIS the Navy doesn't consider pinniped data because they are said not to normally occur within the range; but this rationale would not hold for the RIMPAC exercise given that two species, the Northern elephant seal and the critically endangered Hawaiian monk seal, occur within the sites that the Navy has proposed, and indeed the Navy predicts that one monk seal would be exposed to sound exceeding the hearing loss threshold. RSPEA at 4-15.

c. Permanent Hearing Loss Threshold

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[47] Letter from Douglas P. Nowacek, Ph.D., Florida State University, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 3-4 (undated comments on the Navy's Undersea Warfare Training Range DEIS) (citing several studies on bottlenose dolphins, beaked whales, and Michrochiropteran bats).

[48] The Navy's interpretation of the data do not make any allowances for these conditions. Letter from David Mann, Ph.D., University of South Florida, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 1 (Nov. 2, 2005)

[49] That is, it would (appropriately) capture more of the TTS that had actually been observed in the subject animals. See Letter from David Mann, Ph.D., University of South Florida, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 1 (Nov. 2, 2005) (observing that conservative interpretation of data would place sound level "at least as low as 190 re 1 μPa^{2}•s, and possibly even lower").

The Navy sets its threshold for permanent hearing loss at 20 dB above its temporary hearing loss threshold, or 215 dB re 1 μPa^{2}•s. As discussed above, the use of permanent hearing loss as a bellwether for injury is contradicted by the available science and is inconsistent with NMFS' own analysis. But the Navy's threshold is arbitrary even with respect to permanent hearing loss.

First, because the Navy's threshold for permanent hearing loss is geared to its standard for temporary hearing loss, and because, for the reasons given above, the latter is set too high, the former should be lowered accordingly.

Second, the Navy's calculation of permanent threshold shift (which it equates to the onset on injury) appears to be based on an improper model. A recent study of threshold shift in pinnipeds found that the amount of hearing loss an animal experiences does not increase linearly with the energy it receives. As the energy intensifies, its rate of hearing loss increases, to such a degree that projections of permanent threshold shift according to traditional, linear models are likely to result in underestimates of harm.[50] Given the uncertainties presented by this study, the Navy should lower its estimate of auditory injury.[51]

d. Threshold of Significant Behavioral Change

The Navy's originally set its threshold for behavioral harassment, the point at which significant behavioral change would occur, at 190 dB re 1 μPa^{2}•s, just 5 dB (EL) below the onset of TTS. This level was based on a remarkably partial and idiosyncratic reading of the available literature and, when propounded in the Navy's DEIS for its Undersea Warfare Training Range off North Carolina, elicited strong, indeed overwhelming objection from a number of leading researchers. NMFS rightfully challenged the Navy on this score, indicating in its own comments on the range why the Navy's threshold was insupportable, and insisted that the Navy adopt an alternative threshold of 173 dB re 1 μPa^{2}•s for its RIMPAC analysis.[52] Unfortunately, NMFS' alternative is itself inconsistent with the scientific literature, with the same scientific opinion that objected to the Navy's threshold, and, indeed, with its own argument.

First, the best available science indicates that NMFS' threshold significantly underestimates the impact zone. NMFS itself—in an excellent and detailed review

[50] D. Kastak, B.L. Southall, R.J. Schusterman, C.R. Kastak, Underwater Temporary Threshold Shift in Pinnipeds: Effects of Noise Level and Duration, 118 Journal of the Acoustical Society of America 3154, 3161 (2005).

[51] See Letter from Thomas Götz, University of St. Andrews, Scotland, to Keith Jenkins, Naval Facilities Engineering Command Atlantic (undated).

[52] Letter from Rodney F. Weiher, Ph.D., NEPA Coordinator, NOAA, to Keith Jenkins, Naval Facilities Engineering Command Atlantic [hereinafter "NOAA Comment Letter"] (Jan. 30, 2006).

of some of the leading data—observes that "profound" behavioral responses to signals similar to mid-frequency naval sonar have been reported in wild marine mammals at lower levels. NMFS Comment Letter at 2-4. And a number of experts commenting on the Navy's analysis concluded that significant behavioral responses have been demonstrated, in a controlled exposure experiment, to occur at energy levels as low as 154 dB re 1 $\mu Pa^2 \bullet s$.[53] Based on this record, NMFS' 173 dB threshold is not supportable.

Second, in arriving at its alternative threshold, NMFS relies on the Navy's captive animal studies, basing its number on the 25th percentile for significant behavioral change. This approach is insupportable. Marine mammal scientists have long recognized the deficiencies of using captive subjects in behavioral experiments. The problem is exacerbated further by the fact that the subjects in question, roughly two belugas and five bottlenose dolphins, are highly trained animals that have been working in the Navy's research program in the SPAWAR complex for years.[54] Indeed, the disruptions observed by Navy scientists, which included pronounced, aggressive behavior ("attacking" the source) and avoidance of feeding areas associated with the exposure, occurred during a research protocol that the animals had been rigorously instructed to complete.[55] For these reasons and others, scientists commenting on Navy's Undersea Warfare Training Range unanimously objected to the use of the captive animal studies for this purpose, describing them as "poor for studying behavioral disruption," noting that "very little can be deduced from [them] with applicability to wild animals," and suggesting that the Navy's analysis from these data "would not stand up to peer review."[56] Basing this crucial standard on such a study makes NMFS' selection arbitrary and capricious.

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[53] Letter from Peter L. Tyack, Woods Hole Oceanographic Institution, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 3 (undated comments on the Navy's Undersea Warfare Training Range DEIS); Letter from Mark Johnson, Ph.D., Woods Hole Oceanographic Institution, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 3 (Jan. 27, 2006); Letter from Douglas P. Nowacek, Ph.D., Florida State University, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 3 (undated comments on the Navy's Undersea Warfare Training Range DEIS). The study in question is D.P. Nowacek, M.P. Johnson, and P.L. Tyack, North Atlantic Right Whales (Eubalaena glacialis) Ignore Ships but Respond to Alerting Stimuli, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences 227 (2004). See also Letter from Peter L. Tyack at 3 (noting that several studies have reported strong responses in porpoises to Constant Frequency or Frequency Modulated signals at far lower levels).

[54] See, e.g., S.H. Ridgway, D.A. Carder, R.R. Smith, T. Kamolnick, C.E. Schlundt, and W.R. Elsberry, Behavioral Responses and Temporary Shift in Masked Hearing Threshold of Bottlenose Dolphins, Tursiops truncates, to 1-Second Tones of 141 to 201 dB re 1 μPa (1997) (SPAWAR Tech. Rep. 1751, Rev. 1).

[55] C.E. Schlundt, J.J. Finneran, D.A. Carder, and S.H. Ridgway, Temporary Shift in Masked Hearing Thresholds of Bottlenose Dolphins, Tursiops truncates, and White Whales, Delphinapterus leucas, after Exposure to Intense Tones, 107 Journal of the Acoustical Society of America 3496, 3504 (2000).

[56] See, e.g., Letter from Peter L. Tyack, Woods Hole Oceanographic Institution, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 2 (undated comments on the Navy's Undersea Warfare Training Range DEIS); Letter from Mark Johnson, Ph.D., Woods Hole Oceanographic Institution, to Keith Jenkins, Naval Facilities Engineering Command Atlantic, Navy 3 (Jan. 27, 2006); Letter from Douglas P. Nowacek, Ph.D., Florida State University, to Keith Jenkins, Naval Facilities Engineering Command Atlantic,

Third, the agencies' exclusive reliance on ELs in setting a behavioral threshold is misplaced. Energy flux density standards were originally developed for use in audiology; when applied to behavior, a context in which sensitization and habituation can occur and in which impacts may not scale linearly over time, their value is substantially limited. It is therefore appropriate for the Navy to set dual thresholds for behavioral effects, one based on ELs and one based on sound pressure levels (SPLs). Indeed, that is what has been recommended for NMFS' own acoustic criteria.[57] For the Navy and NMFS to do otherwise would be arbitrary and capricious.

2. Strandings and Mortalities Associated with Mid-Frequency Sonar

Over the last five years, the association between military active sonar and whale mortalities has become a subject of considerable scientific interest and concern. That interest is reflected in the publication of numerous papers in peer-reviewed journals, in reports by inter-governmental bodies such as the IWC's Scientific Committee, and in evidence compiled from a growing number of mortalities associated with sonar. NMFS' discussion of these issues in its proposed authorization (71 Fed. Reg. 20994-20995), while brief, is considerably better than the Navy's in the RSPEA, which capriciously (1) denies the potential for beaked whale mortalities during the RIMPAC exercise, (2) dismisses the potential for sonar to injure whales at sea, (3) insists that beaked whale mortality cannot occur absent five "contributory factors" present during the Bahamas 2000 mass strandings in the Bahamas, (4) fails to consider the potential for strandings and mortalities in other species of cetaceans, (5) fails even to consider the larger set of stranding events that have been linked to sonar use or naval exercises, and (6) analyzes the 2004 Hanalei Bay strandings in a manner that is wholly inconsistent with NMFS' technical report.[58] As discussed elsewhere in this letter, NMFS' own analysis is problematic primarily in its conclusions about the injury threshold and in its treatment of the potential for injury at sea (71 Fed. Reg. 20995, 21002), which do not reflect the best available science and violate NEPA. 42 C.F.R. § 1502.22 (requiring agencies to evaluate all "reasonably foreseeable" impacts). Beyond this, of course, NMFS' discussion cannot cure the Navy's treatment of the issue in the RSPEA.

3. Modeling of Acoustic Impacts

Navy 4 (undated comments on the Navy's Undersea Warfare Training Range DEIS). Even NMFS observes that "pure tone exposures in laboratory conditions differ physically in several substantive ways from received tactical sonar signals in real-world conditions." NMFS Comment Letter at 3.

[57] B. Southall, NMFS, Noise Exposure Criteria: Structure of the Matrix at sl. 5 (2004) (presentation given by NMFS' Acoustic Criteria Panel at the Third Plenary of the Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals, San Francisco, Cal., 28-30 Apr. 2004).

[58] For a detailed discussion, see NRDC Comment Letter at 18-33.

The Navy bases its calculation of marine mammal impacts on a series of models. Its CASS/GRAB model determines received levels of sound within a limited distance of a sonar array; its MATLAB model converts those received levels into energy levels; its MMEM model translates the Navy's energy levels into a graph of where marine mammal "take" will occur; and its Take Estimation Model model calculates the number of animals (and therefore the number of "takes") within the area of harm. RSPEA at C-1 to 24. In other words, the four models estimate the amount of energy received at each point (or "cell") within the immediate area of an exercise and then estimate the number of animals that would therefore suffer injury or disruption.

It is difficult to fully gauge the accuracy and rigor of these models with the paucity of information that the RSPEA provides. They have not previously been used in the Navy's environmental reviews of acoustic activities, or at least not in those that have been opened to public comment, and, as a group, they appear to differ significantly from other systems, like AIM, that have been used in other contexts to model impacts from both mid-frequency and low-frequency sonar.[59] Given the importance of these models to the Navy's analysis, they must be made available to the public.[60] But even from the limited description in the RSPEA, it is clear that they are deeply flawed. NMFS acknowledges that while some of the assumptions made by the Navy are conservative, others are not. 71 Fed. Reg. 20996. We believe NMFS is mistaken, however, in claiming that the Navy's take numbers are overestimates. Among the non-conservative assumptions that are implicit in the model:[61]

(1) As discussed above, the thresholds established for injury, hearing loss, and significant behavioral change are inconsistent with the available data and are based, in part, on assumptions not acceptable within the field.

(2) The Navy does not properly account for reasonably foreseeable reverberation effects (as in the Haro Strait incident),[62] giving no indication that its modeling sufficiently represents areas in which the risk of reverberation is greatest (RSPEA at C-12);

(3) The Navy does not appear to have modeled for surface ducting (see C-1 to C-24), a reasonably foreseeable event that can significantly enhance propagation in the upper layers of the water column and that seems to have occurred during the 2004 mass stranding in Hanalei Bay (D-3 to D-8);

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[59] See, e.g., Navy, Final Overseas Environmental Impact Statement and Environmental Impact Statement for SURTASS LFA at 4.2-31 to 38 (includes modeling for beaked whales and right whales in Onslow Bay); Hildebrand et al., Modeling the Bahamas Beaked Whale Stranding.

[60] See discussion below at section III(G) ("Project Description and Meaningful Public Disclosure").

[61] For a more detailed discussion, see NRDC Comment Letter at 33-37.

[62] NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington, 5 May 2003 (2005).

(4) The Navy's modeling excludes most of the active acoustic systems that it plans to use during RIMPAC, such as helicopter dipping sonar, active sonobuoys, torpedoes, acoustic device countermeasures, training targets, and range sources;

(5) The model fails to consider the possible synergistic effects of using multiple sources, such as ship-based sonars, in the same exercise, which can significantly alter the sound field, and fails to consider the combined effects of multiple exercises, which, as NMFS indicates, may have played a role in the 2004 Hanalei Bay strandings;[63]

(6) The Navy's analysis of marine mammal distribution and abundance does not incorporate recent data (as summarized in Baird Letter at 2-3) that suggests greater densities and smaller population sizes for certain species; and

(7) The model, in assuming that every whale encountered during an exercise is essentially a new whale, does not address the cumulative impacts on the breeding, feeding, and other activities of species and stocks, either during the RIMPAC 2006 event or during the successive biennial RIMPAC exercise.

The Navy must make substantial changes if its modeling is to meet the "scientific integrity" standard prescribed by NEPA. 42 C.F.R. § 1502.24.

F. Cumulative Impacts

In order to satisfy NEPA, an EIS must include a "full and fair discussion of significant environmental impacts." 40 C.F.R. § 1502.1. It is not enough, for purposes of this discussion, to consider the proposed action in isolation, divorced from other public and private activities that impinge on the same resource; rather, it is incumbent on the Navy to assess cumulative impacts as well, including the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future significant actions." Id. § 1508.7. Thus, for example, it will be necessary to consider the impacts of the proposed exercise alongside those of existing naval activities in the region, including the operations area in which the range would reside, as well as those of industrial and commercial activities such as fishing, shipping, and geophysical research.[64]

As it stands, the RSPEA does not consider cumulative impacts for any species other than marine mammals, even where such impacts could affect protected species as well; and, as for marine mammals, it says little more than that the behavioral harassment it predicts for the exercise would necessarily be short-term in nature. RSPEA at 4-23. The Navy also

[63] Southall et al., Hawaii Melon-Headed Whale at 31, 45.

[64] In the 2005 Energy Policy Act, Congress mandated that the Minerals Management Service conduct an offshore inventory for oil and gas throughout the entire outer continental shelf of the United States, a process that could well extend high-energy seismic exploration to Hawaii. Energy Policy Act of 2005, Pub. L. No. 109-58, §357, 119 Stat. 594, 720. The Navy must evaluate the cumulative impacts stemming from this additional acoustic activity.

offers the bromide that mitigation will preclude any significant or long-term impacts on marine mammals and the marine environment. Not only are both statements factually insupportable given the lack of any population analysis or quantitative assessment of long-term effects in the RSPEA (and the numerous errors in the Navy's thresholds and modeling)—but they misapprehend the definition of "cumulative impact," which, according to NEPA's regulations, "can result from individually minor but collectively significant actions taking place over a period of time." 42 C.F.R. § 1508.7. The fact that the RSPEA is nominally a supplement to an earlier programmatic environmental assessment does not cure the problem, since a proper cumulative impact analysis was not performed in the initial document and, in any case, does not reflect the significant new information that occasions the Navy's reanalysis of acoustic impacts this year.

In short, NMFS must (a) consider cumulative impacts on species such as fish, at least insofar as those impacts affect marine mammals, (b) assess the potential for synergistic adverse effects, as from noise in combination with ship-strikes,[65] (c) properly assess the cumulative impacts of holding biannual RIMPAC exercises in the same areas off Hawaii, and (d), even if NMFS finds that the impacts of present and future RIMPAC exercises are likely to be small, consider whether individual naval exercises in the Hawaiian Islands Operating Area and other activities could combine with RIMPAC to produce a significant effect.

G. Project Description and Meaningful Public Disclosure

Disclosure of the specific activities contemplated by the Navy is essential if the NEPA process is to be a meaningful one. See, e.g., LaFlamme, 852 F.2d at 398 (noting that NEPA's goal is to facilitate "widespread discussion and consideration of the environmental risks and remedies associated with [a proposed action]").

With regard to noise-producing activities, for example, the Navy must describe source levels, frequency ranges, duty cycles, and other technical parameters relevant to determining potential impacts on marine life. The RSPEA and its predecessors provide some of this information, indicating, for example, the nominal source level of the SQS-53 system, which is deployed on surface ships. RSPEA at 2-10. But it fails to disclose any information about helicopter dipping sonar, active sonobuoys, acoustic device countermeasures, training targets, or range sources that would be used during the exercise; and, even with respect to the SQS-53 system, refrains from giving any indication of platform speed, pulse length, repetition rate, beam widths, or operating depths—that is, most of the data that the Navy presumably used in modeling acoustic impacts. RSPEA at 2-10 to 11. Without this information, the process will be a charade, with the public guessing at the nature of the activities proposed for their own backyard.

[65] The 2004 Report of the IWC's Scientific Committee emphasizes the importance of evaluating the synergistic impacts of ocean noise and other stressors, such as toxins. IWC, 2004 Report of the IWC Scientific Committee, Annex K at § 6.4 and App. 2 (noting studies of terrestrial animals that demonstrate significant adverse synergistic effects).

Just as important, the Navy has not released or offered to release any of the modeling systems (CASS/GRAB, MATLAB, MMEM, or the Take Estimation Model) it used to calculate acoustic harassment and injury.[66] These models must be made available to the public, including the independent scientific community, for public comment to be meaningful under NEPA and the Administrative Procedure Act. 42 C.F.R. §§ 1502.9(a), 1503.1(a) (NEPA); 5 U.S.C. § 706(2)(D) (APA). And guidelines adopted under the Data (or Information) Quality Act also require their disclosure. The Office of Management and Budget's guidelines require agencies to provide a "high degree of transparency" precisely "to facilitate reproducibility of such information by qualified third parties" (67 Fed. Reg. 8452, 8460 (Feb. 22, 2002)); and the Defense Department's own data quality guidelines mandate that "influential" scientific material be made reproducible as well.[67]

We drew the Navy's attention to these issues in our February 2006 comment letter, responding to the Navy's draft SPEA, and urged the Navy to contact us immediately to discuss how to make this critical information available. It has not done so.

IV. CONCLUSION

For the reasons set forth above, we urge NMFS to deny the Navy's application for an incidental harassment authorization for RIMPAC 2006. A project of this magnitude and complexity—with its cumulative impacts, its profound controversy, its demonstrated potential for serious harm—must go through the careful, deliberate environmental review that Congress intended.

Very truly yours,

Joel R. Reynolds
Senior Attorney

Michael D. Jasny
Senior Consultant

Cc: Sen. Daniel Inouye

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[66] Any internal reports that the Navy relies on in determining species distribution and abundance must be released as well.

[67] Navy, Ensuring the Quality of Information Disseminated to the Public by the Department of Defense: Policy and Procedural Guidance § 3.2.3.1 (Feb. 10, 2003). The Defense Department defines "influential" to mean "that the Component can reasonably determine that dissemination of the information will have or does have clear and substantial impact on important public policies or important private sector decisions"—which is clearly the case here, in what may be the Navy's first NEPA review of mid-frequency sonar exercises. See Ensuring the Quality of Information Disseminated to the Public by the Department of Defense: Definitions § 3 (Feb. 10, 2003).

Sen. Daniel Akaka
Rep. Neil Abercrombie
Rep. Ed Case

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May 20, 2006

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Dear Steve,

I am writing to provide comments in regards to the Navy's request for an Incidental Harassment Authorization in relation to the RIMPAC exercise in Hawai'i. My basis for these comments comes primarily from undertaking research on odontocete cetaceans in Hawai'i each year since 1999. This research has involved small vessel surveys around all of the main Hawaiian Islands, covering over 34,000 km of trackline, searching for all species of odontocetes (with an emphasis in the last four years on beaked whales), as well as undertaking studies of stock structure and diving behavior. During this period we have collected information from 741 sightings/encounters with 16 species of odontocetes. While some of the results of this work are available in various publications and reports (see www.cascadiaresearch.org/robin/hawaii.htm), the work is on-going and as such most is unpublished.

Based on my review of the information presented in NMFS' proposed incidental take authorization (Federal Register, I.D. 011806L), the Navy's application for an Incidental Harassment Authorization (IHA application), and the Navy's 2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment (2006 PEA), I question the efficacy of the proposed mitigation/monitoring that will be in place. In particular I outline below why:

1) estimates of cetacean densities used in modeling and estimating numbers of individuals to be exposed to high-intensity sounds are underestimated such that the estimate of takes will also be underestimated;

2) population sub-division has not been taken into account, thus the proportions of some populations predicted to be exposed/taken will be greater than that indicated;

3) aerial reconnaissance is insufficient in determining the presence of many species of deep-diving cetaceans due to long dive times and unfavorable sea states;

4) the geographic scope of land-based coverage for animals that may potentially be exposed to sounds in the Alenuiuhaha Channel is inadequate; and

5) limiting sonar use outside of 25 km from the 200 m isobath is insufficient in mitigating impacts on beaked whales and other species.

Several other issues relevant to mitigation and predicting impacts are also discussed below.

Estimated marine mammal densities used in modeling

There are a number of issues associated with the estimated densities used in modeling exposure/takes. The IHA application (page 9, also the 2006 PEA) notes that estimates of densities for modeling exposure of animals within 25 nm of the islands (Table 3-2) were based on Mobley et al. (2000). There are several reasons why use of the Mobley et al. (2000) aerial survey data results in under-estimates of density for some species (and thus under-estimates of the numbers/species of animals exposed to sounds). Densities of long-diving species (e.g., beaked whales, *Kogia* spp., see below), and species that are difficult to detect except in particularly good sea states (e.g., beaked whales, *Kogia* spp.) are negatively biased from aerial surveys. Table 3-2 in the Navy's application notes no dwarf sperm whales within 25 nm of shore, yet this species was the fifth-most frequently encountered species within that range in a recent survey off the island of Hawai'i (Baird unpublished, see also Baird 2005). Table 3-2 also notes no pygmy killer whales within the inshore (within 25 nm) strata, yet there is a small population of apparently resident pygmy killer whales found within 25 nm of shore off the island of Hawai'i (McSweeney et al. 2005). In terms of under-estimating the density of beaked whales, Mobley et al. (2000) acknowledge this (pg. 6), noting that "the abundance estimates presented here for beaked whales and sperm whales probably underestimate the true abundance by a factor of at least two to five", and Barlow and Gisiner (2006) note that an even smaller fraction of beaked whales (approximately 7% of Cuvier's and 11% of Mesoplodon) are likely detected when directly on the trackline, with even lower proportions detected to the side of the aircraft. Abundance/density estimates for two other species (melon-headed whales, rough-toothed dolphins) from Mobley et al. (2000) are substantially lower than abundance determined by mark-recapture analysis based on photo-identification. In the case of rough-toothed dolphins, Mobley et al. (2000) provide an estimate of 123 individuals (CV= 0.88)around all the main Hawaiian Islands, while a mark-recapture estimate for the "marked" population off Kaua'i and Ni'ihau (only a fraction of the area covered by Mobley et al) is 1,759 (CV=0.33) (Baird et al. unpublished manuscript). Thus because aerial surveys underestimate cetacean abundance (and in the case of dwarf sperm whales and pygmy killer whales did not result in any sightings), the estimated number of takes within 25 nm of shore are underestimated.

Population sub-division not taken into account

Evidence from genetic studies of all species so far studied around the Hawaiian Islands (short-finned pilot whales, false killer whales, bottlenose dolphins, spinner dolphins) have indicated that animals around the main Hawaiian Islands are reproductively differentiated from animals elsewhere in the tropical Pacific (see Chivers et al. 2003; Martien et al. 2005; Andrews et al. 2006). In the case of spinner dolphins and bottlenose dolphins, there appears to be additional population structure within the main Hawaiian Islands (Martien et al. 2005; Andrews et al. 2006), with genetic differentiation and no evidence of movements of individuals among the four main groups of islands. Thus, utilizing abundance estimates for the entire Hawaiian EEZ may not be appropriate in determining the proportion of the total population that may be exposed to sounds (Federal Register Table 1). In these cases, the actual proportion of the population

exposed to sounds should be greater than that indicated in Table 1, suggesting that any impacts may affect a much larger proportion of these populations. For example, with bottlenose dolphins the estimated abundance within the OpArea (Table 1 in Federal Register) is 3,263 individuals, and the estimated takes include 1,183 individuals (Table 1), resulting in an estimated 36% of the total population that may be taken. However, based on genetic (Martien et al. 2005) and photo-ID evidence (Baird et al. 2002, 2003, 2006), including mark-recapture analyses (Baird et al. 2001), there is likely a small reproductively isolated population around each island (e.g., off Maui/Lana‘i the mark-recapture estimate was 134 individuals; Baird et al. 2001). Thus it is likely that the estimates of the proportion of some populations that may be taken are strongly negatively biased.

Efficacy of aerial reconnaissance in mitigation/monitoring

Several species of odontocetes in the area of interest may dive for extended periods and therefore will have a very low probability of being detected through aerial overflights. For example, Blainville’s beaked whales and Cuvier’s beaked whales have been documented diving for periods of up to 83 and 87 minutes, respectively, in Hawai‘i (Baird unpublished; Baird et al. 2005), and regularly dive for periods of 50-60 minutes. Short-finned pilot whales may dive for periods of up to 27 minutes in Hawai‘i (Baird unpublished). Dwarf and pygmy sperm whales (*Kogia* spp.) are also known to dive for extended periods. Thus the likelihood of any of these species being detected by aerial reconnaissance is extremely low, even in ideal sea conditions. Unfortunately, the area of the choke-point exercises in the Alenuihaha Channel is one of the windiest areas around the main Hawaiian Islands, with wind speeds typically in the range of 10-15 m/sec (see http://oceanwatch.pifsc.noaa.gov/ssmi/ssmi_hawaii.html), even further reducing the likelihood of detection of these species, or any species of cetacean. Barlow and Gisiner (2006) note that “the effective search width [for beaked whales] is typically only 250-500 m (on each side of the aircraft) for aerial observers searching by naked eye in good to excellent sighting conditions”. Given the typically windy sea conditions in the Alenuihaha Channel and in offshore waters in Hawai‘i, it is clear that the use of aerial reconnaissance to effectively detect animals within the range of sonar operations will be ineffective.

Geographic scope and species coverage from land-based reconnaissance in the Alenuihaha Channel

The land-based reconnaissance for activities to be undertaken in the Alenuihaha Channel (Federal Register, 2006 PEA) note that such reconnaissance will be undertaken between Mahukona and Lapakahi on the island of Hawai‘i. The distance between the Mahukona Lighthouse and the southern boundary of the Lapakahi State Park is approximately 2 km (the exact boundaries of the land-based reconnaissance area are not given in the FR notice). Using the southern boundary of Lapakahi State Park as the SW limit, the linear length of the coastline immediately bordering the southern part of the area outlined for the choke-point exercise in the Alenuihaha Channel is approximately 28 km. The justification for monitoring only such a small proportion of the near-shore area in the Channel is not given (nor is it noted why no shore-based monitoring would be undertaken off the other two islands bordering this channel). Given the typical densities of odontocetes in Hawaiian waters, the likelihood of detecting groups along a 2-km stretch of coastline on any particular day is extremely small. In addition, the near-shore bathymetry on the south side of the Alenuihaha Channel is generally relatively gentle, i.e., there is no deep (> 200 m) water within several kilometers of shore. Thus the species that typically use

the area where land-based observers will be able to document groups are primarily spinner dolphins, bottlenose dolphins, and rarely false killer whales. Some of the species that are thought or known to be most susceptible to impacts from high-intensity mid-frequency sonars (e.g., beaked whales, pilot whales, melon-headed whales) do not occur close enough to shore in this area to be detected from land-based observers. Besides the limited geographic coverage of the land-based site, it is difficult to evaluate the efficacy of this monitoring as no information is presented on the elevation of the observation site, the number of observers, or the methods used to detect cetaceans (e.g., naked eye, 8x binoculars, 25x binoculars, etc).

Limiting sonar use within 25 km of the 200 m isobath is ineffective at limiting exposure

One mitigation measure proposed (Federal Register, 2006 PEA) to minimize exposure to sonar is that "with the exception of three specific choke-point exercises [ ], the Navy will not operate mid-frequency sonar within 25 km of the 200 m isobath". Based on sighting data of Blainville's and Cuvier's beaked whales off the island of Hawai'i (Baird et al. 2005; Baird unpublished), using 25 km from the 200 m isobath as a cut-off point for sonar use will not be effective at limiting exposure of these two species. A quantitative analysis of sighting and effort distances in relation to the 200 m isobath based on these survey data has not been undertaken, however, the distance of sightings from the shoreline for all odontocete sightings and the distance from the 200 m isobath for the furthest offshore beaked whale sightings have been measured. For both Cuvier's and Blainville's beaked whales, the farthest from shore that we have documented these two species is 48.8 km, and these two sightings were approximately 38 km from the 200 m isobath. We have also documented most other species at distances far greater than 25 km from shore (bottlenose dolphins, 30.5 km; dwarf sperm whale, 35.7 km; false killer whale, 69.8 km; melon-headed whale, 43 km; pantropical spotted dolphin, 40.5 km; pygmy sperm whale, 30.2 km; Risso's dolphin, 33 km; rough-toothed dolphin, 49.8 km; sperm whale, 47.2 km; striped dolphin, 36.7 km), despite the fact that the majority of our survey effort is within approximately 30 km of shore. In most areas along the west coast of the island of Hawai'i, the 200 m isobath is within 1-2 km of shore, so these sighting distances are likely all far outside of 25 km from the 200 m isobath. In addition, in the area to the west of the island of Hawai'i there are a number of seamounts that rise to within 1,000 m of the surface. The area offshore west of the island of Hawai'i is also characterized by regular cyclonic eddies which increase productivity (Seki et al. 2001, 2002) and likely result in greater densities of cetaceans far from shore. If the purpose of such a mitigation measure is to reduce the likelihood of exposure of species/individuals which may associate with steeply sloping areas (e.g., Blainville's beaked whales, short-finned pilot whales), or areas of high productivity, sonar use should be excluded from the area with seamounts and cyclonic eddies west of the island of Hawai'i, and the exclusion of sonar within 25 km of the 200 m isobath should be extended to a greater range. While the above-noted discussion focuses on sightings off the island of Hawai'i, it is likely that most of these species also occur > 25 kmoutside of the 200 m isobath off the other islands, though we have not had enough survey effort offshore of these islands to demonstrate this.

Power to detect effects

No information is presented on the statistical power (the probability of rejecting a false statistical null hypothesis) of the monitoring/mitigation plan. In particular, it should be possible to estimate statistical power based on the proposed level of monitoring, estimated densities of different species, and the probability of detecting different species. As well, it should be possible

to estimate the probability of detecting unexpected impacts (e.g., strandings) that may adversely affect the species or stocks involved. Statistical power is directly related to sample size and effect size; as sample size or effect size increases, so does statistical power. In this case, whether the null hypothesis (for simplicity, that as a result of monitoring and mitigation there are no Level A takes of cetaceans due to RIMPAC) is true or false is unknown. If the null hypothesis is false (i.e., there are Level A takes of cetaceans due to RIMPAC), the question is whether the planned monitoring efforts have enough power to detect such effects, or, in the case of monitoring to reduce impacts, whether the monitoring has a high likelihood of detecting groups of animals that can or may be exposed to high sound levels. Based on the level of monitoring outlined, the low density of most species of odontocetes in Hawai‘i, and the low likelihood of detecting long-diving/cryptic species, the effective sample size in this monitoring plan is low, and thus the power to detect impacts and assess the presence of animals to reduce impacts are low. If there are unexpected impacts (e.g., animals which strand or move into shallow waters), the likelihood of detecting such impacts are small unless the animals move into an area under direct monitoring (e.g., between Mahukona and Lapakahi on the island of Hawai‘i), or into an area with regular access by people. In addition, given the prevailing direction of currents in Hawai‘i, and the large number of large sharks which scavenge carcasses, the likelihood of dead animals stranding (and thus having a higher chance of being detected) is very low. Certainly in the area of the Alenuihaha Choke Point Exercises there are huge areas of coastline that do not appear to be monitored under the existing monitoring plan (e.g., along Kaho‘olawe, the south coast of Maui, much of the Kohala Peninsula), and thus the power to detect unexpected impacts is extremely low.

In conclusion, for the reasons outlined above it appears that the monitoring and mitigation proposed for the incidental harassment authorization will be insufficient to detect, much less prevent, Level A takes, particularly of Cuvier’s and Blainville’s beaked whales.

If you would like any additional information on any of the analyses noted above, please do not hesitate to contact me.

Sincerely,

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May 24, 2006

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By Email to PR1.011806L@noaa.gov
And by Certified U.S. Mail

Re: Proposed issuance of Incidental Harassment Authorization to U.S. Navy for RIMPAC 2006 exercises (71 Federal Register Notice Pages 20986-21003)

Dear Mr. Leathery:

On behalf of the Animal Welfare Institute (AWI) and the Ocean Mammal Institute (OMI), we respectfully submit the following comments on the above-referenced proposal by the NMFS to issue an Incidental Harassment Authorization (IHA) to the U.S. Navy (Navy) for its RIMPAC 2006 anti-submarine warfare (ASW) training events (the notice). The proposal to issue an IHA is the response to the Navy's application to harass marine mammals, incidental to conducting RIMPAC, in the U.S. Navy's Hawaiian Operating Area (OpArea) in the summer of 2006. Please enter this comment letter into the record. Dr. Marsha Green, one of the signatories to this letter, has had 16 years experience studying marine mammals in Hawaiian waters, including the effects of noise on their behavior.

The proposed exercise will involve submarines, surface ships and aircraft from the United States and multiple foreign nations in ASW training exercises utilizing mid-frequency sonar.

Mid-frequency active sonar has caused or been implicated in marine mammal stranding incidents that range from behavioral disturbance to death.[1] Over the past few years, a number of international organizations and institutions have acknowledged and in some cases called for action in relation to the association between anthropogenic ocean noise and marine mammal strandings.

[1]The association between mid-frequency active sonar use and marine mammal strandings is widely documented. See, for example, International Council for the Exploration of the Sea (ICES). 2005. *Report of the Ad-hoc Group on the Impact of Sonar on Cetaceans and Fish (AGISC)*. ICES CM 2005/ACE:01, but also the section in this letter entitled *Mid-Frequency Active Sonar and its Impacts on Marine Mammals.*

The mitigation techniques proposed by the Navy in its 2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment (SPEA), as the NMFS points out, are inadequate to prevent the possibility of behavioral reaction that could lead to harm, stranding and death. In the notice the NMFS describes the potential effects of exposure to tactical sonar on marine mammals, ranging from behavioral responses to impacts resulting in mortality. As a condition of issuing the IHA, the NMFS intends to require that the Navy institute additional mitigation and monitoring measures. With these measures in place the NMFS states that it does not expect marine mammals to be exposed to sound of the strength or duration necessary to potentially induce the more severe of the effects on marine mammals.

We do not believe that these additional mitigations go far enough to adequately prevent marine mammal mortality or serious injury leading to mortality, and therefore, an IHA is not the appropriate authorization that the Navy should be applying for or that the NMFS should consider granting.[2]

Furthermore, the recently released findings by the NMFS[3] on the mass live stranding incident of up to 200 melon-headed whales in Halalei Bay that took place during the last RIMPAC event in 2004 should have a significant bearing on the NMFS' decision to authorize the Navy to proceed. The notice discusses this incident, but the NMFS does not adequately address its significance which includes an obligation on the Navy under the NEPA regulations to revise its SPEA and possibly prepare an Environmental Impact Statement (EIS).

For the above-stated reasons, we oppose the proposed issuance of the IHA by the NMFS for the RIMPAC 2006 exercises and urge the NMFS to deny the Navy's application.

The Navy's Draft Environmental Impact Statement for the Undersea Warfare Training Range

The NMFS notice makes reference to the Navy's Draft Environmental Impact Statement (DEIS) for its planned Undersea Warfare Training Range (USWTR), which it states contains, "detailed supporting information for some of the issues discussed in this document." AWI provided comment to the Navy for its DEIS (Enclosure 1), and we therefore incorporate and provide those comments into this comment letter since the same methodologies were used by the Navy in the compilation of both its DEIS and its SPEA.[4]

[2] Marine Mammal Protection Act of 1972 as amended, Section 101(a)(5)(D).

[3] Southall, B. L., R. Braun, F. M. D. Gulland, A. D. Heard, R. W. Baird, S. M. Wilkin and T. K. Rowles. 2006. Hawaiian melon-headed whale (*Peponocephala electra) mass stranding event of July 3-4, 2004*. NOAA Technical Memorandum NMFS-OPR-31. 73 pp.

[4] *2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment.* Appendix C. Revised Preliminary Final. April 2006. U.S. Navy.

Mid-frequency Active Sonar and its Impacts on Marine Mammals

The association between anthropogenic ocean noise and impacts on marine mammals is well documented, although there is still scientific uncertainty over the actual causal mechanisms of impacts. It is generally accepted that impacts can range from altered behavior through temporary injury to mortality.[5] Altered behavior can include a startle response and can affect an animal's ability to: feed, find mates, stay on a migration path, communicate, stay at or return to a favored feeding area, nurse, care for young and catch and escape prey. Temporary injury can have the same consequences, though more severe and prolonged. Mortality can result directly from exposure to sound or indirectly as a consequence of altered behavior or temporary injury.

The effects of exposure to mid-frequency active sonar, sometimes termed "tactical sonar" in the notice, can also range from behavioral responses to impacts resulting in mortality, including non-auditory physiological trauma, permanent threshold shift (PTS) and temporary threshold shift

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[5] Balcomb, K.C. and Claridge. D.E. 2001. *A mass stranding of cetaceans caused by naval sonar in the Bahamas*. Bahamas Journal of Science 8 (2) pages 1-12.

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NOAA and U. S. Navy. 2001. *Joint Interim Report; Bahamas Marine Mammal Stranding Event of 15-16 March 2000*. National Oceanic and Atmospheric Administration.

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Romano, T.A. et al. 2004. *Anthropogenic sound and marine mammal health: measures of the nervous and immune systems before and after intense sound exposure*. Can. Jo. of Fisheries and Aquatic Sciences. 61 pages 1124-1134.

Taylor, B. et al. 2004. *A call for research to assess risk of acoustic impact on beaked whale populations*. Paper SC/56/E36 presented to IWC Scientific Committee, Sorrento, Italy (unpublished).

Weller, D.W. et al. 2002. Influence of seismic surveys on western Grey Whales off Sakhalin Island, Russia in 2001. Paper SC/54/BRG14 presented to International Whaling Commission Scientific Committee, Shimonoseki, Japan (unpublished).

(TTS) of the auditory system, interruptions of essential behavioral or physiological events, alteration of an animal' s time oenergy budget and stress responses.

The Navy claims in its IHA application and SPEA that the proposed activities will not have significant environmental impacts and that no mortality or serious injury leading to mortality would result from the proposed activities. The NMFS disagrees in the notice stating that it believes some marine mammals may react to mid-frequency sonar at received levels lower than those thought to cause direct physical harm, with behaviors that may lead to physiological harm, stranding or, potentially, death. The NMFS is proposing that additional monitoring and mitigation be undertaken. We agree with the NMFS that the Navy's proposed mitigations are inadequate. However, we believe that the NMFS' proposed additional mitigation measures are also inadequate and that it has been empirically demonstrated that behavioral reactions leading to physiological harm, stranding or death can occur at received levels lower than those suggested by the NMFS. Therefore, the NMFS should require that the Navy seek a take authorization rather than an IHA.[6]

The notice discusses the Bahamas stranding incident of 2000, in which 16 animals of three species of marine mammal died because of exposure to U.S. Navy mid-frequency active sonar.[7] Estimates of the average sound exposure level that caused those animals to strand was around 145 dB re 1 µ Pa.[8] In this event, it has been reported that there was a complex environment present, including the presence of a surface duct, unusual and steep bathymetry, a constricted channel with limited egress, and intensive use of multiple, active sonar units over an extended period of time. Other stranding incidents associated with exposure to mid-frequency active sonar have shown that all these factors do not have to be present for marine mammals to strand. The Bahamas incident perfectly demonstrates the need for adoption of the precautionary principle and provides empirical evidence that an exposure level of about 145 dB re 1 µ Pa should be used as the threshold at which behavioral reaction can occur that may lead to physiological harm, stranding or, potentially, death.

Similarly, in the Hanalei Bay stranding incident of 2004[9], the notice states that the Navy's modeling of the event calculated a received level of 147.5 dB re 1 µ Pa-s @1 m during the incident. The Navy report states that this level is below the experimentally established behavioral reaction threshold and concludes that it was unlikely that the sonar caused the animals to enter the bay. Even if this were the case (and the NMFS report on the incident says that sonar

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[6] Marine Mammal Protection Act of 1972 as amended, Section 101(a)(5)(D).

[7] Department of Commerce and Secretary of the Navy. 2001. *Joint Interim Report: Bahamas Marine Mammal Stranding Event of 15-16 March 2000*.

Balcomb, K.C. and Claridge. D.E. 2001. *A mass stranding of cetaceans caused by naval sonar in the Bahamas*. Bahamas Journal of Science 8 (2) pages 1-12.

[8] Hildebrand, J. and Balcomb, K. 2004. *Modeling the Bahamas Beaked Whale Stranding of March 2000* (Presentation at the Third Plenary Meeting of the U.S. Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals, 27-29 July 2004, San Francisco, California).

[9] Southall, B. L., R. Braun, F. M. D. Gulland, A. D. Heard, R. W. Baird, S. M. Wilkin and T. K. Rowles. 2006. Hawaiian melon-headed whale (*Peponocephala electra) mass stranding event of July 3-4, 2004*. NOAA Technical Memorandum NMFS-OPR-31. 73 pp.

cannot be ruled out), the sonar likely prevented the animals from leaving the bay and therefore likely caused the stranding incident.

This Hanalei Bay report is significant because it provides an indication that beaked whales are not the only marine mammal that can be behaviorally impacted by anthropogenic ocean noise and that impacts can occur at intensity levels similar to those that caused mortality in the Bahamas stranding. In all, there are at least five documented incidents of naval activity during which non-beaked whales have stranded.[10] This suggests that the mechanisms associated with noise and its impacts on marine mammals are still far from understood, underlining the need for precaution.

Internationally, concern over the association between anthropogenic ocean noise and marine mammal strandings has grown significantly. Bodies acknowledging the problem of ocean noise and in some instances, calling on member states to act include: the United Nations General Assembly on Oceans and the Law of the Sea (2005), International Whaling Commission (2004), European Parliament (2004), World Conservation Union (2004) and parties to the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) (2004). This recognition of a problem by the international community should be heeded by NMFS in its decision-making process.

Mitigation Measures

The notice describes how the Navy will use trained observers to look out for marine mammals on its ships and aircraft. These persons, though trained in marine mammal spotting, are not dedicated marine mammal spotters, but are also used to observe for floating trash and other objects and possible threats. Though spotters are a commonly used mitigation measure, it is a highly inadequate method when used in isolation. Whales are naturally diving creatures who come to the surface to breathe. Several species of whale, including beaked whales - of which three species are expected to occur in the vicinity of the OPAREA[11] - can dive for extended periods, sometimes well over an hour,[12] making the chances of seeing a whale, even to a trained observer, very difficult. Estimates on the probability of seeing a beaked whale by a trained observer on a <u>good</u> day is less than 2 percent.[13]

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[10] Table 2, Associated Mass Strandings Involving Species Other Than Beaked Whales, International Ocean Noise Coalition at: www.awionline.org/whales/Noise/IONC/Stranding_Tables.htm.

[11] Baird, R. et al. 2005. *Diving Behavior and Ecology of Cuvier's (Ziphius cavirostris) and Blainville's Beaked Whales (Mesoplodon densirostris) in Hawai'i*. Cascadia Research Collective, Olympia, WA for Southwest Fisheries Science Center, NMFS, La Jolla, CA.

[12] Baird, R. et al. 2005. *Diving Behavior of Cuvier's and Blainville's Beaked Whales: Implications for Mass-Strandings in Relation to High-Intensity Sonar*. The 16th Biennial conference on the Biology of Marine Mammals, San Diego, CA December 12-16, 2005. Abstract.

[13] Barlow, J. 2004. *Presentation at the Beaked Whale Technical Workshop*, Baltimore, MD. April 13-16, 2004. The report of this meeting will be contained in Cox, T. M. et al. In Press. *Report of a workshop to understand the impacts of anthropogenic sound on beaked whales*; H. Levine. (2004) *Active Sonar Waveform* 1 (2004) (JASON Group Rep. JSR-03-200).

The notice describes how passive detection for marine mammals will be conducted to some extent. This is proposed to be achieved by submarine sonar operators reviewing detection indicators for marine mammals who may have approached the vessels. The reviews will be performed prior to the commencement of ASW operations involving active mid-frequency sonar. This may be useful when used to complement observers on deck, though even when combined with observers is not foolproof.[14]

In the event that marine mammals are detected close aboard, the Navy proposes that all ships, submarines and aircraft engaged in ASW would reduce mid-frequency active sonar power levels. Helicopters will not dip their sonar within 200 yards of a marine mammal and shall stop pinging if a marine mammal closes within 200 yards after pinging has begun. This "safety zone" is not conservative enough.

The notice describes how the Navy's proposed safety radii, power-down, and shut-down zones have been replaced with "*more conservative measures*" required by the NMFS.

The NMFS Proposed Additional Mitigation Requirements

The NMFS proposes a requirement that the Navy operate its sonar at the lowest practicable level not to exceed 235 dB, except for occasional short periods of time to meet tactical training objectives. The NMFS does not expand on what it means by "*short periods of time*" or "*tactical training objectives*." The very purpose of the RIMPAC exercises is for military personnel to undergo training that can only be interpreted as "*tactical,"* which makes this requirement meaningless.

The remainder of the NMFS additional "*more conservative*" mitigation requirements are based entirely on the Navy's ability to detect a marine mammal within 1,000 m of the sonar dome. The inadequacies of the described marine mammal detection methods are discussed above. Evidence indicates that the added measures will not provide absolute certainty that mortality or serious injury leading to mortality of marine mammals will not result.

The NMFS is requiring that if marine mammals are spotted within 1000 m of the sonar dome, then the intensity level of the sonar will be reduced by 6 dB. This would reduce the intensity level from 235 to 229 dB. This intensity level is still well above the 145-150 dB level that caused the Bahamas animals to strand and die and the Hanalei Bay animals to mill for over 28 hours.

Similarly, the NMFS is requiring that if marine mammals are observed within 500 m of the dome, then the sonar level is to be reduced by 10 dB. Again, this would only reduce the level to 225 dB and for the same reasons stated above, is grossly inadequate.

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[14] Barlow, J. and Rankin, S. 2005. *Estimates of the Percentage of Sperm Whales missed on Combined Visual and Acoustic Surveys in the Eastern Pacific Ocean*. The 16th Biennial conference on the Biology of Marine Mammals, San Diego, CA December 12-16, 2005. Abstract.

The NMFS will only require shut down of the sonar when animals are spotted within 200 m of the sonar dome. To have reached so close to the sonar dome, not only would an animal have likely received noise levels of such intensity that mortality is almost certain through acoustic trauma or PTS, but the observation mitigation measures will obviously have failed.

These additional mitigation measures do not take into account the cumulative and synergistic effects of multiple noise sources being employed at any one time or over time. Such effects should be addressed before any authorization is issued.

NEPA Requirements

The findings of the Hanalei Bay report impose a legal obligation on the Navy to perform a revision of its SPEA because the findings of the report constitute significant new information relating to the potential impacts of the upcoming RIMPAC 2006 action. Additionally, the findings of the report may provide sufficient evidence to mandate preparation by the Navy of an EIS, not just an EA.

The SPEA states that, "*[N]o new training events are proposed*"[15] for RIMPAC 2006, yet the NMFS report on the Hanalei Bay stranding incident concluded that sonar used during the Navy's RIMPAC exercises was the likely cause of the stranding in which up to 200 melon-headed whales live-stranded and one calf died. The report concludes, "*we consider the active sonar transmissions of July 2-3, 2004, a plausible, if not likely, contributing factor*".

The Navy discusses the Hanalei Bay stranding incident in its 2006 Supplemental PEA and states that, "*[T]here are many possible causes for whales appearing in Hanalei Bay ...and many possible causes for stranding, including sick individual members of a pod. Clearly the starvation death of a newborn whale was not caused by RIMPAC naval activities. Although there will be no definitive answers to why the whales entered Hanalei Bay on the morning of July 3, 2004, the Navy will be prepared to cease active sonar use if there are indications that an event similar to the 2004 Hanalei Bay event is occurring during an ASW training event."*[16]

This conflicts with the NMFS report on the incident for two reasons. First, regarding the death of the calf, the NMFS report states that, "*[A]lthough we do not know when the calf was separated from the female, the movement into the Bay, the milling and re-grouping may have contributed to the separation or lack of nursing especially if the maternal bond was weak or this was a primiparous calf."* Secondly, the NMFS found the Navy's active sonar to be a *"plausible, if not likely contributing factor"* in the stranding.

The findings in the NMFS report provide significant new circumstances AND significant new information that bear on the proposed RIMPAC 2006 exercise AND its impacts. Therefore, the

[15] SPEA, Table 2-2, page 2-5 and page 2-6.

[16] SPEA page 4-14.

Navy is obligated under NEPA, at a minimum, to revise its EA and probably to prepare an EIS for the RIMPAC 2006 exercises.

In conclusion, based on the severe and increasing concern about the mechanisms and magnitude of the impacts of mid-frequency active sonar on marine mammals, the inadequate mitigations proposed for RIMPAC 2006 and the existence of new information on the harm caused to marine mammals by the most recent RIMPAC exercise that took place in the same location with the same noise sources, intensities and durations as the proposed RIMPAC 2006, we oppose the proposed issuance of the IHA by NMFS for the RIMPAC 2006 exercises. We strongly urge the NMFS to deny the Navy's application and apply the precautionary principle in line with international convention in its deliberations.

The Animal Welfare Institute and the Ocean Mammal Institute appreciate the opportunity to comment and look forward to our comments being fully addressed.

Sincerely,

Cathy Liss
President
Animal Welfare Institute

Marsha L. Green, Ph.D.
President
Ocean Mammal Institute

Encl.

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January 30, 2006

Mr. Keith Jenkins
Naval Facilities Engineering Command Atlantic
Code EV21KJ
6506 Hampton Boulevard
Norfolk, VA 23508

Re: Draft Overseas Environmental Impact Statement/Environmental Impact Statement Undersea Warfare Training Range (USWTR) (70 Federal Register 62101-62103)

Dear Mr. Jenkins:

The Animal Welfare Institute respectfully submits the following comments on the above-referenced proposed Draft Overseas Environmental Impact Statement/Environmental Impact Statement for the Undersea Warfare Training Range (DEIS). Please enter this comment letter into the record.

Preferred Alternative: No Action.

The DEIS is wholly inadequate in identifying and assessing all the potential impacts of the proposed action in accordance with the National Environmental Policy Act. The DEIS fails to sufficiently address obvious problems with respect to environmental impact in order to defend the three USWTR sites chosen for military convenience rather than to minimize impacts to the environment. The DEIS omits scientific data, especially that which conflicts with its claims, does not use current scientific evidence as part of its impact analysis, makes unsubstantiated claims, and in instances when impacts cannot be ignored or minimized, offers inadequate mitigations or glosses over the situation, stating that the Navy will cooperate with the appropriate agency to get around the problem.

1.0 The Need for the USWTR

Under the heading US World Role and the Global War on Terror (page 1-2), the DEIS claims that it is imperative that US military forces are the best trained, prepared, and equipped in the world and that anti-submarine warfare is a critical part of that mission. The inference from this is that terrorist groups are or are anticipated to be equipped with submarines that could threaten

the shallow coastal waters of the US or its allies. However Al Qaeda does not have a submarine force as stated by Captain Toady of the Navy[1]. In justifying the need for the USWTR, Captain Toady went on to say that Al Qaeda doesn't have an air force either yet was able to use aircraft to threaten the US and that it would be a dereliction of duty to assume that Al Qaeda could not use undersea warfare weapons as a threat to the US. To justify the need for the USWTR with the threat of terrorism is groundless.

The DEIS should include a full explanation as to why the USWTR will enable Navy personnel to become more effectively trained to combat the protagonists of the War on Terror or remove this justification from the document. If the reasoning is classified, the DEIS should so state.

The DEIS briefly discusses the use of simulators as a means of training its personnel in the use of active sonar. It states that "*even with advances in simulator technology, there is little capability for simulators to fully replicate the variability of acoustic transmission….. a simulator cannot match the dynamic nature of the environment, either in bathymetry, thermography, or oceanography*" (page 2-3). This is statement is not backed up by corroborated evidence. Given the current advanced state and pace of technological development and the sizeable resources which seem available to the Navy to spend on active sonar training, simulators that could approximate the range should be first rate. To dismiss the use of simulators in place of all or part of the USWTR in only 110 words is unreasonable. The DEIS should provide a thorough justification, backed up by scientific evidence, as to why simulators are unable to replicate, either partially or fully, the dynamic nature of the marine environment.

The DEIS explains that the USWTR is needed to train navy personnel in realistic anti-submarine warfare (ASW) in the littoral zone, that the use of acoustic sensors is the best method to search for submarines, and that active sonar is the most useful form of acoustic sensor in this time of quieter diesel or air-independent submarines. The DEIS fails to identify the alternatives to acoustics that can be used to search for submarines.

2.0 Site Selection Process

The DEIS states that in conducting the site selection process, the Navy evaluated operational requirements, proximity to the Fleet's homeport and training concentration areas, and quantitative requirements including range logistics support (page 2-15). Using requirements of proximity to fleet concentration areas needlessly imposes constraints that dismiss other alternatives without due consideration. This is also incongruous with the Navy's mission of being able to operate from off-shore logistics and strike platforms.

[1] Informational meeting regarding the Navy's proposed Undersea Warfare Training Range (USWTR) Draft Environmental Impact Statement (DEIS), held at the Booz Allen Hamilton McClean Campus facility, McClean, VA, November 10, 2005.

The DEIS states that a "*nearby secure federal airfield is required to support helicopter recovery services of submarine targets and EXTORPs"* (page 2-19). The implication of this is that the Navy no longer has ships from which helicopters can operate. This is an unnecessary criteria that only serves to eliminate otherwise potentially viable alternatives.

In reference to the shore landing site and infrastructure, the DEIS states that the USWTR range should be located offshore of an "*established, operational, federal shore installation…with direct access to the sea"* (page 2-19). This is another criteria that needlessly excludes otherwise potentially viable alternatives. The Navy can and does lease land for other purposes around the world and could for the very small facility required on shore.

3.0 DEIS Document Preparers

The biological communities present in the marine environment are discussed at length in the DEIS since these communities will be affected by the proposed action. However, the list of preparers of the DEIS includes only one person with a degree in marine biology and none with an advanced degree in this subject. The DEIS should be prepared by experts. Since the majority of the potential impacts from the USWTR affect the marine environment and its biological communities, a marine biologist with an advanced degree in the subject should be a co-preparer of the document.

4.0 The DEIS Does not Comply with NEPA

The National Environmental Policy Act (NEPA) requires an *EIS for actions that may significantly affect the quality of the human and natural environments.* The EIS *must disclose significant environmental impacts and inform decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts.* (page 1-13)

Throughout the DEIS document, the Navy introduces impacts that have the potential to be significant and then systematically and without solid basis trivializes these impacts, often resorting to quoting selective scientific reports or making wild assumptions based on flimsy evidence.

5.0 Species Speciously Dismissed

The DEIS uses a ranking system to predict the occurrence of marine mammals and sea turtles at the three Alternative sites. The ranks range from "*Concentrated occurrence*" through "*Expected occurrence*" and "*Low/unknown occurrence*" to "*Occurrence not expected*" (page 2.3-22).

The *Low/unknown* occurrence rank is nonsensical as *unknown* cannot be equated to *low*. Occurrence of a species in an area may be unknown because it has not been studied, but that

does not mean that its occurrence is necessarily low. The DEIS should be amended to separate the Low/unknown occurrence category into Low and Unknown.

The DEIS points out several times that though a species is expected to occur in an OPAREA, it won't be found in the USTWR area. For instance, minke whales in OPAREA A (page 3.2-25), spinner dolphins in OPAREA A (3.2-33), Clymene dolphin in OPAREA B (page3.2-42), fin whales in the OPAREA C (page 3.2-47). Marine mammals are highly mobile and range over many miles every day. The USTWR sites lie within the respective OPAREAS, so to state that an animal will be in the OPAREA but won't travel through or into the USTWR site is illogical.

Pinnipeds

The DEIS summarily dismisses pinnipeds from any discussion on impacts because "*Pinniped species are not likely to occur at the proposed USWTR sites*" (page 3.3-5). It makes this claim based on its statement that the four pinniped species known to occur in the western North Atlantic Ocean only range as far south as south of New Jersey and Delaware.

The Delaware Atlantic sea board lies within OPAREA B and the DEIS also acknowledges that both harbor seals and hooded seals have been sighted (albeit infrequently) in the most southerly OPAREA off Jacksonville, Florida (page 3.2-53). Surely if harbor seals and hooded seals have been found in the most southerly OPAREA, then they had to have been off the coasts of Maryland, Virginia, North Carolina, South Carolina and Georgia where the first two OPAREAS lie. More recent assessments conducted by the National Marine Fisheries Service (NMFS) support this.[2]

Manatees

The DEIS dismisses manatees from its analysis of all non-landside environments because, it claims, the species primarily inhabits estuarine and coastal waters and that even at OPAREA C (Florida) the probability of encountering manatees is very low. Manatees are listed as endangered under the Endangered Species Act. The number of manatee deaths spiked in 2005, the second highest yearly total on record[3]. With the fragility of this species being of particular concern, even if there is a low probability of encountering a manatee as the DEIS claims, the species should not have been so readily dismissed from the DEIS.

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[2] Waring, G. T. et al. 2003. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments* accessed on January 24, 2006 at http://www.nefsc.noaa.gov/nefsc/publications/tm/tm182/, pages 103 and 121, state that harbor seals and hooded seals are being seen more frequently off the Carolinas and Florida respectively.

[3] Save the Manatee Club. 2005. "*2005 Is Second-Highest Mortality Year On Record.*" Accessed on January 24, 2006 at http://www.savethemanatee.org/news_feature_2005_mortality.htm.

Manatees have also been reported to hear at up to 1,400 Hz or 1.4 kHz[4] which is at the low end of the mid-frequency range of the active sonar to be used at the USTWR. Intense mid-frequency sound can travel great distances from the source giving a potential for acoustic impact to Florida manatees.

With regard to the landside impacts, the DEIS states that the manatee is known to occur in coastal northeast Florida and that shallow grass beds are preferred feeding areas for manatees in coastal habitats. OPAREA C encompasses coastal northeast Florida. The DEIS states that "*extensive grass beds are not likely to occur in the turbid waters off the beach at Naval Station Mayport* [the land portion of Alternative C] *and thus, manatee presence is expected to be limited.*" (page 4.6-11)

According to the DEIS, the Navy intends to employ observers on cable laying vessels to ensure "*that the cable installation process does not interfere with or entangle any marine mammal*". (page 6-9) The DEIS does not say how many observers will be used. With regard to manatees, the DEIS adds that since the construction phase is of limited duration, the chance for contact with manatees is also limited. This is not a mitigation measure – it only takes a few seconds to strike and kill a manatee.

Seabirds

The DEIS excludes seabirds from the acoustic impacts analysis despite stating that *[T]here are few data on hearing in seabirds and even less on underwater hearing* (page 3.3-6) and that "*it is likely that many diving birds can hear mid-frequency sound.*" (page 3.3-7) The reasons given for this swift exclusion are:

- there is no evidence that seabirds use sound underwater;
- seabirds spend a very small fraction of their time submerged; and
- they can rapidly disperse to other areas if disturbed.

Absence of evidence does not equate to evidence of absence and even if there was evidence suggesting that seabirds do not use sound underwater, this doesn't mean that they will not be impacted by noise. In addition, even if some seabirds do spend a very small fraction of their time submerged, while it might lessen the likelihood of severe acoustic impact, it doesn't mean that impacts won't happen and certainly is not true for deep diving birds.

Seabirds rapidly leaving a feeding area if disturbed by noise could constitute an acoustic impact under the MMPA.

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[4] Mann, D. et al. 2005. *Temporal resolution of the Florida manatee (Trichechus manatus latirostris) auditory system*. Journal of Comparative Physiology A: Sensory, Neural, and Behavioral Physiology, 191 (10) pages 903-8.

6.0 Marine Debris

The DEIS describes how material used in the exercises which the Navy considers expendable, will be left to sink to the sea bed. Items listed in the DEIS to be annually discarded to the sea bed include:

- 48 control wires which each comprise a thin narrow gauge copper wire inside a detachable flex hose;
- 48 flex hoses, each 250 feet-long, some of which (the improved flex hoses) each contain 53 lbs of lead;
- air launch accessories which, depending on the type, may include protective nose cover, suspension bands, air stabilizer, release wire, and propeller baffle, nose cap, sway brace pad, arming wire, and fahnstock clip;
- five sets of rocket motor, airframe, nose cap, parachute, and two lead weights;
- 10,364 lbs of lead ballast;
- 132 expendable bathythermographs;
- 7,884 sonobuoys each measuring 3ft by 0.4ft;
- 33 acoustic device countermeasures;
- 50 mobile acoustic torpedo targets.

This represents a sizeable amount of debris, which the DEIS claims will be unlikely to result in any significant environmental impacts (page 4.1-3) because the debris will not only sink without incident to the sea bed, but will degrade, corrode and become assimilated into the sediments. (Later the document contradicts this claim with respect to the control wires [page 4.1-11], which it states are not likely to deteriorate or corrode rapidly since they are coated with a polyolefin.)

Throughout its discussion on the potential impacts of the USTWR debris, the DEIS discusses and then dismisses each one for each type of potentially impacted organism. In each instance the explanations as to why the impacts will not be significant are totally inadequate and where a negative impact cannot be explained away, the DEIS states that the Navy will consult with the National Marine Fisheries Service. A few examples follow.

Lead is a Resource Conservation and Recovery Act classified hazardous material and is discussed in some depth in the DEIS, separately for each component to be used during USWTR exercises. Lead's affect on marine life is discussed briefly in the DEIS which states that elevated lead concentrations have been found in the livers of marine mammals in "lead hotspots' but that it is not thought to biomagnify (not bioaccumulate) in the food chain since higher concentrations are found in invertebrates than in the animals who eat them. This discussion, though promising, is inadequate in explaining why the DEIS concludes that the impact from lead on the

environment will be insignificant. The DEIS states that lead in saltwater corrodes at a rate of 1.96 lbs per year. The operation of the range will involve the deliberate annual discharge of almost 6 tons of lead in the same geographical area, year in and year out. The accumulation of the lead on the sea bed will have significant impacts.

Similarly the DEIS claims that every one of the 48 control wires and 48 flex hoses discarded each year will sink to the sea floor without incident and that the risk of entanglement with marine animals would be low. Such a claim cannot be made without scientific proof that these wires and hoses, which are hundreds of feet long, won't tangle or interfere with an animal, other debris from the range exercise or with another inanimate object on its way down through over 1,000 feet of water. The only literature cited to discount entanglement is a 1957 paper which discussed entanglement with undersea cables. The relative thicknesses of the cables cited in the study and the control wires and flex hoses to be used at the USWTR are not detailed in the DEIS so the reader is left wondering if the cited literature can actually be satisfactorily compared to the wires and flex hoses.

A similar claim is made with regard to the air stabilizer canopies and suspension lines, which the DEIS states could billow on the sea bed and potentially pose an entanglement problem. The DEIS then claims that since the canopies are highly visible, entanglement will be unlikely. This implies that marine animals will see the canopies and will then somehow avoid them. Hazards, which will remain are being introduced into their environment.

The DEIS states that due to the large size of the non-floating air launch debris (which it says will range from 11 inches to 44 inches long), there is a small risk of ingestion by animals, except for bottom-feeding whales. It then goes on to conclude that the air launch accessories would not likely affect listed species or take species protected under the MMPA. This conclusion is irresponsible for two reasons. Firstly, 11 inches is not large, especially from the point of view of a marine mammal such as a dolphin or a whale whose prey is often larger. Second, the DEIS states that bottom-feeding whales could ingest the air launch debris but does not explain why this is not an impact.

7.0 Impacts to Invertebrates

The DEIS claims that only individual benthnic invertebrate impacts will result from use of the USTWR but that population impacts will be insignificant. With regard to acoustic impacts, the DEIS dismisses invertebrates altogether stating that mid-frequency sonar is not considered to be in their primary hearing register (page 3.3-3) and that invertebrates at the three sites already experience noise from shipping without adverse impact. The DEIS substantiates the first claim by citing a few studies but none to justify the second claim about the impacts of shipping noise.

It is generally accepted that scientific knowledge about the effects of sound on invertebrates is scant, so to assume that invertebrates will not be impacted by mid-frequency sound just because

they cannot hear it is irresponsible. There are studies which suggest that noise comparable to mid-frequency sonar may impact invertebrates.[5] Until it has been scientifically demonstrated and accepted that noise from active sonar cannot ever impact invertebrates, the precautionary principle should be applied.

8.0 Impacts to Fish

The DEIS claims that significant effects to fish are not anticipated. The DEIS substantiates this claim citing studies performed on captive individuals of select species of fish. To extrapolate the impact of noise on a few captive and presumably conditioned individuals to all species of fish in the wild is scientifically unsound. In reality, numerous studies[6] performed on fish in the wild actually demonstrate severe impacts from noise comparable to mid-frequency sonar, and not only to individuals but to populations. The DEIS claims that there is no evidence to suggest that non-impulsive noise kills fish. There is at least one study that suggests that non-impulsive noise can kill fish.[7] The DEIS also ignores the effects of masking on fish.

At all three sites there are substantial commercial and recreational fishing interests. In North Carolina, the preferred choice for the USWTR, there is concern about declines in fish populations that are targeted by commercial fishing interests.[8] To summarily dismiss impacts to fish without a more thorough analysis is reckless.

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[5] Department of Fisheries and Oceans (DFO). 2004. *Potential impacts of seismic energy on snow crab*. DFO Can. Sci. Advis. Sec. Habitat Status Report 2004/003;

Guerra, A., et al. 2004. *Calamares gigantes varados: victimas de exploraciones acústicas*. Investigacion y Ciencia (Spanish edition of Scientific American) July 2004: 35-37;

MacKenzie, D. 2004. Seismic surveys may kill giant squid. New Scientist.com news service, 22 Sept.;

McCauley, R.D., et al. 2000. Marine seismic surveys: analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid. CMST 163, Report R99-15, prepared for the Australian Petroleum Production Exploration Association from the Centre for Marine Science and Technology, Curtin University, Perth, Western Australia.

[6] Dalen, J. and Knutsen, G. M. 1987. Scaring effects on fish and harmful effects on eggs, larvae and fry by *offshore seismic explorations*. Pages 93-102. In: Merklinger, H. M. (Ed.). Progress in Underwater Acoustics. New York: Plenum Press;

Engâs A., et al. 1996. Effects of seismic shooting on local abundance and catch rates of cod (Gadus morhua) and haddock (Melanogrammus aeglefinus). Can. J. Fish. Aquat. Sci. 53: 2238-2249;
Løkkeborg, S. 1991. *Effects of a geophysical survey on catching success in longline fishing*. ICES CM B:40. page 9;
Løkkeborg, S. and Soldal, A.V. 1993. *The influence of seismic explorations on cod (Gadus morhua) behaviour and catch rates*. ICES mar. Sci. Symp. 196. pages 62-67;

Popper. A. N. 2003. The effects of anthropogenic sounds on fishes. Fisheries 28 (10): 24-31.

[7] Turnpenny, A. et al. 1994. The effects on fish and other marine animals of high-level underwater sound. Report prepared for UK Defense Research Agency FRR 127/94, Fawley Aquatic Research Laboratories, Ltd., UK.

[8] Rich, B. 2006. *Fisheries resolution circulates*. Maritime scholars sound the alarm over decline of commercial fishing. Morehead City News-Times, January 25, 2006.

9.0 Impacts to Sea Turtles

The DEIS states that five species of turtle can be found at the three sites, and that four are listed as endangered under the Endangered Species Act, and the fifth, the loggerhead is threatened. The Site A USWTR (land and nearshore portions) actually falls within the Onslow Bay turtle sanctuary. Yet despite acknowledging the existence of such rare and vulnerable creatures, the DEIS claims that since four of these species of turtles hear best at low frequencies, the impacts from the USWTR noise will be negligible. For the turtle sanctuary, the DEIS states that the Navy will bury the trunk cable running from the grid of transducer nodes to the shore and so negate possible impacts.

Studies cited in the DEIS are those conducted on captive animals. For leatherbacks the DEIS states that though there is no hearing data; "*it is probably safe to say that leatherbacks are not expected to have their best hearing capability in the mid- and high-frequencies*." (page 3.3-5) It is not scientifically defensible to say that since turtles cannot hear a noise at a certain frequency, they cannot be impacted by it. Similarly, the data obtained from a handful of captive specimens cannot be extrapolated to all species of turtles in the wild.

The DEIS claims that Green, loggerhead, and Kemp's Ridley sea turtles may brumate (hibernate) on the sea bed in shallow waters in the vicinity of Site C during cold periods. This presents an entanglement problem with the trunk cable. The DEIS states that the Navy will get around this by consulting NMFS. Surely since these turtles are endangered species, the Navy should commit to either burying the cable to a depth below which turtles will burrow or remove Alternative C from the list of Alternatives (given the additional presence of manatees as previously discussed, and North Atlantic right whales, discussed in subsequent paragraphs.)

10.0 Impacts to Marine Mammals

The effect of the range on marine mammals is likely the most significant environmental impact to be assessed in the DEIS for all three Alternatives. Indeed, the DEIS devotes many dozens of pages to discussing marine mammals and particularly acoustic impacts.

North Atlantic Right Whale

The DEIS acknowledges that the North Atlantic right whale is one of the most imperiled cetaceans on the planet. There are predicted to be only about 300 of these animals left and because of numerous ship strikes in recent years, including by Navy vessels, concern over its future is grave. Sadly, there have been two right whale deaths reported in the month of January

2006[9] alone, yet the Alternative C OPAREA off Jacksonville, Fla. includes a large portion of habitat designated as critical habitat for these whales (page 3.2-46). Based entirely on this fact, Alternative C should be withdrawn from consideration.

Instead, the DEIS states that the USTWR at Alternative C will be well beyond this critical habitat and no further explanation is given. With regard to ships transiting the migration paths, the DEIS lists the following mitigation measures that will be employed:

- that during certain months of the year and in certain geographical locations "Navy vessels will practice increased vigilance" to avoid vessel-whale interactions;
- while transiting within 30NM of the coast to have at least two watchstanders posted, including at least one lookout that has completed required marine mammal awareness training; and
- to "*avoid knowingly approaching any whale head on*" (page 4.2-13).

With regard to other Alternative OPAREAs, the DEIS claims that the same mitigation measures will ensure no likely adverse impact.

To merely practice increased vigilance when one is talking about only 300 individuals of a species left in the world is totally unsatisfactory. The Marine Mammal Commission in its comment letter on the USWTR notes that *the death or serious injury of a single North Atlantic right whale would constitute a significant population-level effect* [emphasis ours].[10]

These mitigation measures have not been suggested because of the USTWR and are not unique to the DEIS. These measures have been employed by the Navy for some time with respect to North Atlantic right whales. Interestingly, as the DEIS points out, perhaps in trying to 'dilute' its impact, the Navy comprises 2-3% of the overall large vessel traffic, yet the Navy has a very poor record when it comes to vessel strikes with this highly endangered species despite these mitigation measures. This makes the DEIS claim that the mitigations will ensure "*Navy vessels are not likely to adversely affect North Atlantic right whales"* clearly ludicrous.

Anthropogenic Noise

The operation of the USWTR will change the acoustic makeup of the Eastern Seaboard forever. In describing the range and its operation, the DEIS lists the following potential noise sources:

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[9] Associated Press. 2006. *Endangered right whale calf found dead off Jacksonville Beach*. January 22, 2006; and Daytona Beach News-Journal. 2006. *Scientists: Ship strike likely cause in whale's death*. January 14, 2006.

[10] Letter from David Cottingham, Executive Director, Marine Mammal Commission to Mr. Keith Jenkins, Naval Facilities Engineering Command–Atlantic, January 18, 2006.

- Engine, propeller, and hull noise from vessels used at the site including: Submarines, surface ships, aircraft, helicopters, and support vessels.
- SQS-53 mid-frequency sonar operating at a source level of 235 dB re $1\mu Pa^2$ s @ 1m;
- SQS-56 mid-frequency sonar operating at a source level of 225 dB re $1\mu Pa^2$ s @ 1m;
- Submarines auxiliary sonar systems for ice and mine avoidance, top and bottom soundings and communication;
- Aircraft sonobuoys and dipping sonars;
- Torpedo autonomous guidance systems that ensonify the target and use received echoes for guidance;
- Acoustic Device Countermeasures that act as decoys to avert localization and/or torpedo attacks;
- Training Targets that simulate target submarines by using acoustic projectors to emanate sounds to simulate submarine acoustic signatures and/or by using echo repeaters to simulate the characteristics of the echo of a particular sonar signal reflected from a specific type of submarine;
- Other noise sources described in the DEIS include range pingers and range transducer nodes.

The DEIS states that the USTWR will be used for up to 161 exercises a year with each exercise lasting six hours. With the added time taken for ships and other naval craft to transit to and from the USWTR site, the actual times when disturbances will occur could easily be for 8 hours per day, every other day.[11]

The association between anthropogenic ocean noise and its impacts on marine mammals is well documented although there is still scientific uncertainty over the actual causal mechanisms of impacts. It is generally accepted that impacts can range from altered behavior through temporary injury to mortality.[12] Altered behavior can include a startle response and can affect an animal's

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[11] The calculated transit times to and from the USWTR site are very conservative and are based on the following assumptions: that vessels will be traveling at a top speed of about 30 knots. The approximate time to arrive at the nearest edge of each Alternate site is: Site A – 1 ½ hours; Site B – ¾ hour; Site C – 2½ hours.

[12] Balcomb, K.C. and Claridge. D.E. 2001. *A mass stranding of cetaceans caused by naval sonar in the Bahamas*. Bahamas Journal of Science 8 (2) pages 1-12;

Cox, T. M. et al. In Press. *Report of a workshop to understand the impacts of anthropogenic sound on beaked whales*;

Engel, M. H. et al. 2004. *Are seismic surveys responsible for cetacean strandings? An unusual mortality of adult humpback whales in Abrolhos Bank, northeastern coast of Brazil*. Paper SC/56/E28 presented to IWC Scientific Committee, Sorrento, Italy (unpublished);

Fernandez, A. et al. 2005. "*Gas and fat embolic syndrome" involving a mass stranding of beaked whales (Family Ziphiidae) exposed to anthropogenic sonar signals*. Vet Pathology. 42. pages 446–457;

ability to: feed, find mates, stay on a migration path, communicate, stay at or return to a favored feeding area, nurse, care for young, and to catch and escape prey. Temporary injury can have the same consequences, though more severe and prolonged. Mortality can result directly from exposure to sound or indirectly as a consequence of altered behavior or temporary injury.

In its discussion of acoustic impacts (which the DEIS calls 'effects') the DEIS is flawed because it:

- chooses to base its whole evaluation of the potential acoustic impacts to marine mammals on selective and flimsy data, while ignoring more accurate, widely accepted and peer reviewed science, including a comprehensive interpretation of actual stranding data;
- chooses to assume that the primary effect of sound on an animal will be to the auditory system;
- not only extrapolates data from studies on a few captive animals of a handful of species to all cetaceans in the wild, but also extrapolates data from captive, terrestrial animals to acoustic marine animals;
- dismisses masking based on false conclusions about the nature of the noises produced by the USWTR;
- uses flawed modeling to approximate the degree of impact to numbers of specific marine mammal species; and
- casually dismisses cumulative (and synergistic) effects by minimizing the magnitude of the potential impacts and explaining away the unavoidable impacts with promises of ineffectual mitigation measures.

(footnote 12, continued from previous page)
Frantzis, A. 1998. *Does acoustic testing strand whales?* Nature. 392. page 29;

International Whaling Commission Scientific Committee (IWC/SC). 2004. Annex K: *Report of the Standing Working Group on Envifronmental Concerns*. Annual IWC meeting, Sorrento, Italy, 29 June–10 July 2004. page 56;
Jepson, P. D. et al. 2003. *Gas-bubble lesions in stranded cetaceans. Was sonar responsible for a spate of whale deaths after an Atlantic military exercise?* Nature. 425. pages 575-576;

Levine, H. 2004. *Active Sonar Waveform* JASON Group Report. JSR-03-200;

Miller, P.J.O. et al. 2000. *Whale songs lengthen in response to sonar.* Nature. 405 page 903;

Morton, A.B. and Symonds, H.K. 2002. *Displacement of Orcinus orca (L.) by high amplitude sound in British Columbia*. ICES Journal of Marine Science. 59. pages 71-80;
NOAA and U. S. Navy. 2001. *Joint Interim Report; Bahamas Marine Mammal Stranding Event of 15-16 March 2000*. National Oceanic and Atmospheric Administration;

Richardson, W.J. et al. 1995. *Marine Mammals and Noise*. New York: Academic Press, page 576.

Romano, T.A. et al. 2004. *Anthropogenic sound and marine mammal health: measures of the nervous and immune systems before and after intense sound exposure*. Can. Jo. of Fisheries and Aquatic Sciences. 61 pages 1124-1134;

Taylor, B. et al. 2004. *A call for research to assess risk of acoustic impact on beaked whale populations*. Paper SC/56/E36 presented to IWC Scientific Committee, Sorrento, Italy (unpublished);
Weller, D.W. et al. 2002. *Influence of seismic surveys on western Grey Whales off Sakhalin Island, Russia in 2001*. Paper SC/54/BRG14 presented to International Whaling Commission Scientific Committee, Shimonoseki, Japan (unpublished).

Acoustic Effect Analysis and Harassment Calculations

From its acoustic effect analysis and harassment calculations, the Navy concludes that the "*impacts to species or stocks of marine mammals would be negligible for each of the proposed USWTR alternatives."* It supports this conclusion with the statement that "*the overwhelming majority of the acoustic exposures are within the non-injurious TTS or behavioral effects zones*." (page S-12)

With regard to beaked whales the DEIS claims that it makes a special case because of the Bahamas stranding incident where "Navy mid-frequency sonar has been identified as the most plausible contributory source to the stranding event." (page 4-3.30) For beaked whales, the Navy changes the definition of Level A harassment in the DEIS to include behavioral effects, although it makes sure to state that no direct injury to beaked whales is predicted.

When it comes to individuals, the Navy claims that incidental harassment is estimated for a number of species of marine mammals and that to reconcile this it will submit a letter of authorization from NMFS for the preferred Alternative. The so-called analysis by which this conclusion is reached is based entirely on selective and flimsy data which ignores more accurate, widely accepted and peer reviewed science.

The DEIS defines injury related to an action as "*the destruction or loss of biological tissue*" and "*[b]ehavioral disruption as occurring when "there is a change in behavior as a result of the* action". (page 4.3-5)

It later defines Level A harassment as including "*any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild*" and that the injury (destruction or loss of biological tissue) "*will result in an alteration of physiological function that exceeds the normal daily physiological variation of the intact tissue*."

It defines Level B harassment as including "*all actions that disturb or are likely to disturb a marine mammal or marine mammal stock in the wild through the disruption of natural behavioral patterns....to a point where such behavioral patterns are abandoned or significantly altered*." (page 4.3-5 and 4.3-6)

The received sound exposure thresholds used in the DEIS are given in terms of energy flux density level (EL) which attempts to reconcile the standard measurement of sound pressure level over the duration of the sound. A conservative calculation to use for duration for the USTWR site would be six hours which is the maximum duration of a single exercise. This assumes that the exercise vessels do not make noise, including active sonar use, during transit to and from the site. The argument that sonar pings will only occur every 25 seconds and that exposed animals can recover during pings is absurd when one takes into account reverberation and other sound sources in operation at the same time, which as the DEIS explains, could include up to a dozen sources.

The thresholds used for Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) in the DEIS are based on minimal and sometimes out-dated studies. Similarly, the threshold used in the DEIS to anticipate behavioral disturbance should be based on the most widely accepted scientific field data and on the most sensitive individual in a group. It is not. PTS, TTS and behavioral thresholds have been calculated in the DEIS based on the results of experiments conducted on a few captive and presumably, conditioned individuals from a couple of species. Where there are data gaps, the DEIS extrapolates data from experiments on terrestrial animals.

The DEIS uses data from TTS experiments conducted on five *trained* dolphins and two beluga whales (page 4.3-12) which it calls a relatively large number of test subjects. The responses of seven individual captive animals who have been conditioned to noise cannot be translated to all types of cetaceans in the wild. This is especially troublesome as the DEIS extrapolates from odondocetes (toothed whales) to mysticetes (baleen whales). The DEIS comes up with 195 dB re 1 µPa2-s as the TTS threshold and 215 dB re 1 μPa^2-s for the PTS threshold.

Similarly the DEIS describes how it "*uses behavioral observations of trained cetaceans exposed to intense underwater sound under controlled circumstances to develop a criterion and threshold for behavioral effects."* Based on nine individuals from a couple of species (who the DEIS claims "*are closely related to the majority of animals expected to be located within the proposed USWTR area*"), the DEIS comes up with a figure for behavioral disturbance in 50% of instances as 190 dB re 1 μPa^2-s. To use 50% might be a "*common and accepted psychophysical technique*" but it is certainly not a "*conservative approach to predicting Level B harassment for military readiness activities."* (page 4.3-26) A conservative approach would have been to use the lowest level at which any of the tested subject reacted. Because captive animals are conditioned and cannot accurately represent all species of marine mammals in the wild at all life stages and for both sexes, any lab-derived figures must be viewed with skepticism as is compared to the actual field data.[13]

Extrapolating from terrestrial animal hearing data to marine mammals is even more unreasonable. Marine mammals are acoustic individuals who spend their entire lives immersed in sound in water. Their bodies have evolved to make use of sound to navigate, communicate, find food, locate and attract mates, and avoid predators. Their world is "surround sound" at its best. Marine mammals also don't just use their ears to detect sound. Though there are physical similarities between terrestrial and marine mammal ears, the environment in which each is used is very different and there is not scientific proof to justify an assumption that data on one can be used to represent the same data on another.

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[13] Morton, A.B. and Symonds, H.K. 2002. *Displacement of Orcinus orca (L.) by high amplitude sound in British Columbia*. ICES Journal of Marine Science. 59. pages 71-80;

Richardson, W.J. et al. 1995 *Marine Mammals and Noise*. New York: Academic Press;

Weller, D.W. et al. 2002. *Influence of seismic surveys on western Grey Whales off Sakhalin Island, Russia in 2001*. Paper SC/54/BRG14 presented to International Whaling Commission Scientific Committee, Shimonoseki, Japan (unpublished).

In predicting what noise levels might induce effects on a marine mammal, rather than using captive marine and terrestrial animals, surely it would be appropriate to use data from actual events when available.

Such an event is the Bahamas multi-species mass stranding incident of 2000 in which 16 animals of three species of marine mammal stranded because of the Navy's use of active mid-frequency sonar.[14] Estimates of the average sound exposure level that caused those animals to strand was less than 140 dB dB re 1 μPa.[15] In order to compare this figure with the DEIS thresholds for behavioral disturbance, TTS and PTS, this figure would have to be converted to EL for each animal based on the exposure duration.

Since this incident is the only known source for baseline data from an actual event where the direct correlation between sonar use and marine mammal impact has been accepted by the noise producer, the Navy, it would be remiss of the Navy not to perform such an exercise in the DEIS and then to use the results as part of its analysis.

The DEIS states that the Bahamas incident cannot be compared to the USTWR site because, it claims, the bathymetry around the Bahamas is different to that around the USWTR sites and because the circumstances of the naval exercise that preceded the strandings was different to the proposed USWTR use. Little is known about the actual mechanism that caused the animals to strand, so to immediately leap to the conclusion that the Bahamas incident doesn't count is reckless. Surface ducting for example, is given as a reason for the uniqueness of the Bahamas stranding (page 4.3-31), yet given the right circumstances, surface ducting could also occur in the waters at the OPAREA sites and must therefore be taken into account during the analysis.

The Bahamas incident is the only event in which a noise producer has publicly acknowledged culpability. As the DEIS points out, other strandings coincident with naval activity have also occurred, though the DEIS list is incomplete.

A more comprehensive list follows:

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[14] Department of Commerce and Secretary of the Navy. 2001. *Joint Interim Report: Bahamas Marine Mammal Stranding Event of 15-16 March 2000*.

[15] Hildebrand, J. and Balcomb, K. 2004. *Modeling the Bahamas Beaked Whale Stranding of March 2000* (Presentation at the Third Plenary Meeting of the U.S. Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals, 27-29 July 2004, San Francisco, California).

Year	Location	Species (numbers)[16]
1960	Sagami Bay, Japan	Cuvier's beaked whale(2)
1963	Gulf of Genoa, Italy	Cuvier's beaked whale (15+)
1963	Sagami Bay, Japan	Cuvier's beaked whale (8-10)
1964	Sagami Bay, Japan	Cuvier's beaked whale (2)
1966	Ligurian Sea, Italy	Cuvier's beaked whale (3)
1967	Sagami Bay, Japan	Cuvier's beaked whale (2)
1974	Corsica	Cuvier's beaked whale (3), Striped dolphin (1)
1974	Lesser Antilles	Cuvier's beaked whale (4)
1978	Sagami Bay, Japan	Cuvier's beaked whale (9)
1978	Suruga Bay, Japan	Cuvier's beaked whale (4)
1979	Sagami Bay, Japan	Cuvier's beaked whale (13)
1985	Canary Islands	Cuvier's beaked whale (12+) Gervais' beaked whale(1)
1987	Suruga Bay, Japan	Cuvier's beaked whale (2)
1987	Canary Islands	Cuvier's beaked whale (2)
1988	Canary Islands	Pygmy sperm whale (2) Cuvier's beaked whale (3) Bottlenose whale (a beaked whale) (1)
1988	Canary Islands	Cuvier's beaked whale (3) Bottlenose whale (a beaked whale) (1) Pygmy sperm whale (2)
1989	Sagami Bay, Japan	Cuvier's beaked whale (3)
1989	Canary Islands	Cuvier's beaked whale (15+) Gervais' beaked whale (3) Blainville's beaked whale (2)
1990	Suruga Bay, Japan	Cuvier's beaked whale (6)

Stranding Table continues overleaf

[16] Data for the stranding table collated from the following sources:

Brownell, R.L. et al. 2004. *Mass strandings of Cuvier's beaked whales in Japan: U.S. Naval acoustic link?* Paper SC/56/E37 presented to the International Whaling Commission Scientific Committee, Sorrento, Italy (unpublished);

International Council for the Exploration of the Sea (ICES). 2005. *Report of the Ad-hoc Group on the Impact of Sonar on Cetaceans and Fish (AGISC)*. ICES CM 2005/ACE:01;

Martin, V. et al. 2004. *Mass strandings of beaked whales in the Canary Islands*. In: Evans, P.G. H. and Miller, L. A. (Eds.). Proceedings of the Workshop on Active Sonar and Cetaceans. European Cetacean Society Newsletter, No. 42 (Special Issue). Pages 33-36.

(Stranding Table con't)

Year	**Location**	**Species (numbers)**[17]
1991	Canary Islands	Cuvier's beaked whale (2)
1996	Greece	Cuvier's beaked whale (12)
1997	Greece	Cuvier's beaked whale (9+)
1999	Virgin Islands	Cuvier's beaked whale (4)
2000	Madeira	Cuvier's beaked whale (3)
2002	Canary Islands	Cuvier's beaked whale (9) Gervais' beaked whale (1) Blainville's beaked whale (1) beaked whale spp. (3)
2003	Washington, United States	Harbor porpoise (14) Dall's porpoise (1)
2004	Hawaii, United States	Melon-headed whale (~200)
2004	Canary Islands	Cuvier's beaked whale(4)
2005	North Carolina, United States	Long-finned pilot whale (34) Dwarf sperm whale (2) Minke whale (1)

The DEIS singles out beaked whales for special attention. This much is commendable since of the documented strandings that have occurred coincident with naval activities, there are more beaked whales that any other type of cetacean. There have been suggestions that this is due to the beaked whales' deep diving behavior which when coupled with a startle response such as a reaction to noise, leads to a form of decompression sickness.[18]

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[17] Data for the stranding table collated from the following sources: Brownell, R.L. et al. (2004). *Mass strandings of Cuvier's beaked whales in Japan: U.S. Naval acoustic link?* Paper SC/56/E37 presented to the IWC Scientific Committee. (unpublished); International Council for the Exploration of the Sea (ICES). (2005). *Report of the Ad-hoc Group on the Impact of Sonar on Cetaceans and Fish (AGISC)*. ICES CM 2005/ACE:01; Martin, V. et al. (2004). *Mass strandings of beaked whales in the Canary Islands*. In: Evans, P.G. H. and Miller, L. A. (Eds.). Proceedings of the Workshop on Active Sonar and Cetaceans. European Cetacean Society Newsletter, No. 42 (Special Issue). Pages 33-36.

[18] Fernández, A. et al. 2005. *"Gas and Fat Embolic Syndrome" Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals*. Vet Pathology 42 pages 44657;

Jepson et al. 2003. *Gas-Bubble Lesions in Stranded Cetaceans*, 425 Nature. Pages 575-76;

Houser, D.S. et al. 2001. *Can Diving-induced Tissue Nitrogen Supersaturation Increase the Chance of Acoustically Driven Bubble Growth in Marine Mammals? Journal of Theoretical Biology*. 213 (2). 21 November 2001. Pages 183-195.

There is also an increasing belief that other species may experience a similar condition, notably sperm whales.[19] The DEIS states that sperm whales can be expected to occur in the vicinity of Alternatives A and B USWTR sites and possibly in the OPAREA C though east of the USWTR site. The DEIS calculates that eight sperm whales per year will be affected by the USWTR at Site A, 16 at Site B, and though it states that sperm whale are expected at Site C, its states that density estimates are "*zero*" (page 4.3-51).

As the table above shows, there have been six documented stranding incidents associated with naval activity where non-beaked whales have stranded. This provides a further indication that the mechanisms associated with noise and its impacts on marine mammals are still far from understood, underlining the need for precaution.

The DEIS does not take into account the effects to marine mammals who do not strand on land or in shallow water to be found by marine scientists. Stranding incidents have occurred where animals have died and remained at sea.[20] It is likely that many impacted individuals go unrecorded. Animals who are impacted at sea are far harder to quantify and the fact that Alternative A is over 50 miles from the coast perhaps means that there is more chance of marine mammals being impacted but not detected. Since the Bahamas incident of 2000, the local population of beaked whales that had been studied and recorded for many years prior to the incident, has almost disappeared since subsequent sightings have been few. This suggests a population level impact from a <u>single</u> naval action.[21]

The DEIS claims that the primary physiological effects of sound are on the auditory system and based this claim on a paper almost a decade old. In the past ten years there have been ten marine mammal stranding incidents related to naval activities. Where necropsies were possible, severe non-auditory impacts have been observed.[22]

Exercises at the USTWR site could involve over a dozen sound sources. The DEIS dismisses those with source levels below 205 dB re 1 µPa @ 1m because, it claims, a 1-second ping at this level would attenuate below the [DEIS determined] Level B threshold at a distance of about 18 feet. Thus, the DEIS only considers five sound sources and even with these doesn't adequately take into account the cumulative impacts of all five.

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[19] Moore, J and Early, G.A. 2004 *Cumulative Sperm Whale Bone Damage and the Bends*. Science, 306 (5705) Page 2215.

[20] Ferndandez, A. et al. 2005. *"Gas and Fat Embolic Syndrome'' Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals*. Vet Pathology 42:446–457.

[21] Balcomb, K.C. and Claridge. D.E. 2001. *A mass stranding of cetaceans caused by naval sonar in the Bahamas*. Bahamas Journal of Science 8 (2) pages 1-12.

[22] Ferndandez, A. et al. 2005. *"Gas and Fat Embolic Syndrome'' Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals*. Vet Pathology 42:446–457; Jepson et al. (2003). Gas-Bubble Lesions in Stranded Cetaceans, 425 Nature. Pages 575-76.

For reasons already given, using 205 dB re 1 µPa @ 1m as a 'cut-off' is not conservative and conflicts with existing data from actual studies showing behavioral and injurious impacts far below this level.

Masking

Masking occurs when meaningful sounds produced by marine animals are obscured or 'masked' by other sounds, usually anthropogenic in nature and often at or near the same frequency as the original sound. Masking is important because it can affect an animal's behavior and thus its ability to feed, find mates, stay on a migration path, communicate, stay at or return to a favored feeding area, nurse, care for young, and to catch and escape prey.

The DEIS claims that the "*chance of sonar operations causing masking effects is considered negligible*." (page 4.3-29) The DEIS justifies this statement by saying that the duration of the noises emitted from the USWTR will be too short, the number too limited and the frequency bands too narrow for masking to occur. It also states that the sound won't propagate beyond a limited area around the source. The many noise sources at the USTWR site have been listed previously in this document. Ping repetition rates documented in the DEIS are 25 seconds. Reverberation also is inevitable. To claim that none of these noise sources either separately or cumulatively will be in the frequency range of all marine mammals who might be in the area is a huge stretch.

Modeling

The DEIS used a system of modeling to predict acoustic impacts from each selected source on actual marine mammal populations at the three sites. This modeling is based on the pre-determined thresholds for PTS, TTS and behavioral disturbance which are questionable and previously addressed earlier in this letter. The modeling used in the DEIS is claimed to have been approved by Navy-Standard Oceanographic and Atmospheric Master Library (OAML). In-house approval is not commensurate with rigorous scientific peer review. The models break down each sound source into a separate entity to create an "acoustic footprint" (page 4.3-38).

The modeling methods used in the DEIS are flawed. They do not take into account to any degree of satisfaction reverberation, which can prolong the duration of a sound as described; surface ducting, which will extend the amount of distance a sound will travel; multiple sound sources operating the same time; sound sources with source levels less than 205 dB re 1 µPa @ 1m; the proven that mid-frequency sound can travel at distances greater than 3,300 feet.

11.0 Mitigation Measures

Even with the high thresholds used in the acoustic impact analysis, the DEIS concedes that impacts will occur, but only behavioral impacts. Throughout the DEIS, the Navy states that predicted impacts are calculated without using mitigation measures and that where impacts are predicted, it will consult with the National Marine Fisheries Service.

The only mitigation measures that the Navy provides are for acoustic impacts, vessel transits during right whale migratory seasons, the landside component of the action, and the cable installation. There are no mitigation measures explained for: non-acoustic impacts to marine animals or the threat of vessel strike for other species of marine animal other than right whales.

It is strange that the DEIS makes no mention of using passive acoustic monitoring to detect marine mammals. It is a technology that has been found to be useful in complementing observers on deck, though even when combined with observers is not foolproof.[23]

Observers

The DEIS describes how marine mammal spotters will be used to look out for marine mammals by bridge personnel for ships and aviation units. Though spotters are a commonly used mitigation measure, it is a highly inadequate method when used in isolation for the following reasons:

- Whales are naturally diving creatures who come to the surface to breathe, so the chances of seeing a whale, even to a trained observer are not absolutely certain;
- Beaked whales are the only cetacean that the DEIS claims will receive Level A harassment. These whales can dive for periods up to 68 minutes,[24] and the estimated probability of seeing a beaked whale by a trained observer, on a good day is less than 2%;[25]
- Using trained Navy crew members who presumably have other duties to look for marine mammals is inadequate.

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[23] Barlow, J. and Rankin, S. 2005. *Estimates of the Percentage of Sperm Whales missed on Combined Visual and Acoustic Surveys in the Eastern Pacific Ocean*. The 16th Biennial conference on the Biology of Marine Mammals, San Diego, CA December 12-16, 2005. Abstract.

[24] Baird, R. et al. 2005. *Diving Behavior of Cuvier's and Blainville's Beaked Whales: Implications for Mass-Strandings in Relation to High-Intensity Sonar*. The 16th Biennial conference on the Biology of Marine Mammals, San Diego, CA December 12-16, 2005. Abstract.

[25] Barlow, J. 2004. *Presentation at the Beaked Whale Technical Workshop*, Baltimore, MD. April 13-16, 2004. The report of this meeting will be contained in Cox, T. M. et al. In Press. *Report of a workshop to understand the impacts of anthropogenic sound on beaked whales*; H. Levine. (2004) *Active Sonar Waveform* 1 (2004) (JASON Group Rep. JSR-03-200).

- Spotters can never be 100% reliable, but may be used in concert with other mitigation measures, such as passive acoustic monitoring to improve the chances of seeing a marine mammal. To achieve any degree of effectiveness, spotters must be trained individuals, dedicated to the spotting purpose only and a vessel must contain sufficient number to relieve each other and staged at various locations around a ship.

Decreasing the Sonar Level

The best mitigation measure to reduce acoustic impacts proposed in the DEIS, is to turn down the sonar by six decibels when a marine mammal is sighted within 200-300 meters of the vessel. This is shameful. The interim report of the Bahamas stranding incident of 2000 of which the Navy was a co-author, made several recommendations regarding mitigation measures to avoid stranding incidents. These recommendations at a minimum should have been used in preparation of the USTWR mitigation measures. The Bahamas incident resulted from a single transit. The USTWR will be used almost every other day in the same location, year in and year out.

Ship Strikes

A discussion of the inadequate mitigation measures proposed in the DEIS to protect North Atlantic right whales has already been presented earlier in this letter. Since however, this is one of the most endangered animals on our planet, it deserves reiteration.

The main threat to the North Atlantic right whales is from ship strike as vessels transit to and from the USTWR site. It must be also noted that noise could also threaten these whales as they migrate along the coast. The DEIS lists the following mitigation measures that will be employed:

- that during certain months of the year and in certain geographical locations "Navy vessels will practice increased vigilance" to avoid vessel-whale interactions;
- while transiting within 30NM of the coast to have at least two watchstanders are posted, including at least one lookout that has completed required marine mammal awareness training; and
- to "*avoid knowingly approaching any whale head on*" (page 4.2-13).

To merely practice increased vigilance when only 300 individuals of a species are left in the world is totally unsatisfactory. The Marine Mammal Commission in its comment letter on the USWTR notes that *the death or serious injury of a single North Atlantic right whale would constitute a significant population-level effect* [emphasis ours].[26]

[26] Letter from David Cottingham, Executive Director, Marine Mammal Commission to Mr. Keith Jenkins, Naval Facilities Engineering Command–Atlantic, January 18, 2006.

These mitigation measures have not been suggested because of the USTWR and are not unique to the DEIS. These measures have been employed by the Navy for some time with respect to North Atlantic right whales. Interestingly, as the DEIS points out in trying to 'dilute' its impact, the Navy comprises 2-3% of the overall large vessel traffic, yet the Navy has a very poor record when it comes to vessel strikes with this highly endangered species despite these mitigation measures. This makes the DEIS claim that the mitigations will ensure "*Navy vessels are not likely to adversely affect North Atlantic right whales"* clearly ludicrous.

To employ only one trained marine mammal look out is totally unsatisfactory.

These ship strike mitigation measures are described for North Atlantic right whales only and will only be employed for certain months of the year when encounters with right whales are expected. A ship strike hazard to other marine animals exists but is not included in the DEIS.

The DEIS is severely flawed and should be withdrawn and re-written to incorporate the precautionary principle in line with sound scientific practice. The Animal Welfare Institute appreciates the opportunity to comment and looks forward to its comments being fully addressed.

Sincerely,

Cathy Liss
President

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May 24, 2006

Steve Leathery, Chief
Permits, Conservation and Education Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Pacific Whale Foundation

Comments on U.S. Navy permit application for Incidental Harassment Authorization of marine mammals during RIMPAC operations in the Hawaiian Islands

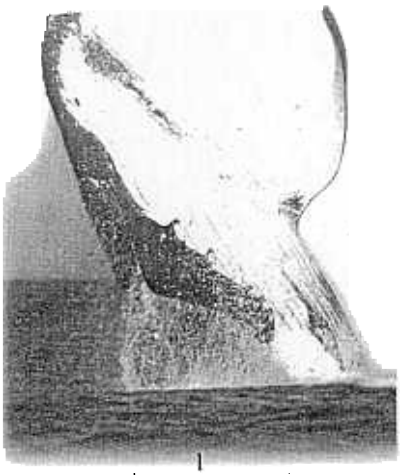
Dear Mr. Leathery:

The U.S. Navy has recently submitted a request to the National Marine Fisheries Service (NMFS) for an Incidental Harassment Authorization (IHA) to allow the incidental take of marine mammals associated with Rim of the Pacific (RIMPAC) Antisubmarine Warfare (ASW) activities occurring in the Hawaiian Islands Operating Area.

Pacific Whale Foundation has grave concerns about the potential impacts of sonar activities on marine mammals and other wildlife subsequent to RIMPAC ASW activities. Due to a lack of evidence that the proposed sonar levels will not cause Level A harassment under the Marine Mammal Protection Act (MMPA), we urge NOAA to utilize the precautionary principle and call on the U.S. Navy to halt sonar activities planned for the RIMPAC Hawaiian Islands Operating Area.

There are numerous known potential impacts of mid-frequency sonar on marine animals, including: physiological effects (e.g. decompression sickness, tissue damage, auditory damage and immune system suppression), behavior effects (e.g. stranding, displacement from habitat), perceptual effects (e.g. sound and communication masking, interference with echolocation), chronic effects (e.g. habituation and sensitization), and indirect effects (e.g. degradation of habitat, decrease in prey availability) (Jasny et al. 2005).

Mid-frequency active sonar has been linked to numerous cetacean mass stranding events, including one in 2004 that was associated with RIMPAC activities off Kauai, Hawaii. Approximately 200 melon-headed whales swam into the shallow waters of Hanalei Bay, Kauai about six hours after RIMPAC sonar was deployed. The National Marine Fisheries Service (NMFS) recently stated that it is "plausible, if not likely" that RIMPAC sonar was the cause for this stranding event (Southall et al. 2006).



There exist at least four other cetacean strandings that are thought to have been caused by mid-frequency sonar activities, including those

PWF

Pacific Whale Foundation is a non-profit, tax-exempt center for marine research, conservation & education.

in the Bahamas (2000), Greece (1996) Maderia (2000) and the Canary Islands (2002) (Balcomb and Claridge 2001, Frantzis 1998). In these stranding events, necropsies showed significant evidence of loud sound trauma, including bleeding and hemorrhaging in inner ears, eyes, brain, lungs; as well as emboli and tissue lesions similar to symptoms of decompression sickness (Frantzis 1998, Jepson et al. 2003). In all of these cases, military training involving mid-frequency active sonar was conducted off shore prior to the atypical strandings.

Behavioral avoidance has been documented in various cetacean species at source levels much lower than the level of 173 decibels as agreed upon by the Navy for RIMPAC activities. In fact, grey, blue, sperm, humpback, and killer whales have all been observed reducing their vocalizations and altering their swimming (speed and direction), breathing, and diving behaviors when exposed to sounds ranging from 110 to 170db (Green and Moore 1995, Jasny et al. 2006, Miller et al. 2000).

RIMPAC activities will have a mid-frequency active sonar source level of at least 173 decibels (dB), and can exceed 235 dB. The pings will have a duration between .5 and 2 seconds, and be deployed every 28 seconds at a frequency ranging between 2.6 and 3.3 kHz. However, even brief signals such as this can travel through the marine environment in such a way as to seem almost continuous (NRDC 2005). In addition, beaked whales that stranded as a result of active sonar were many miles from the sonar source, and well outside the perimeter of presumed safety (Jasny et al. 2005).

The evidence linking cetacean strandings with anthropogenic sounds in the ocean is building. In July of 2004 the International Whaling Commission concluded that "the weight of accumulated evidence now associates mid-frequency military sonar with atypical beaked whale mass strandings. The evidence is very convincing and overwhelming." (NRDC 2005) Even if the evidence only points to the fact that sonar is the potential cause, it strongly does so, and as of yet no other potential cause has been suggested. In relation to the melon-headed whale stranding of 2004 associated with RIMPAC, NMFS has officially stated that sonar activities were a likely factor in the stranding (Southall et al. 2006).

At least 27 marine mammal species have been documented in the RIMPAC Hawaiian Island Operating Area, including seven endangered species (Federal Register 2006). Three species of beaked whales, a species known to be heavily affected by anthropogenic sound, are found in the area. Other deep-diving cetaceans such as sperm whales are also known to occur in the area. This, coupled with the existence of other factors defined by NMFS to be factors in cetacean strandings related to mid-frequency sonar (surface ducts and high bathymetric relief), indicate that there is a strong likelihood that the impact from RIMPAC activities will be much more significant than the "negligible" impact as defined by NMFS.

In terms of monitoring potential impacts and ensuring no protected species are nearby via visual methods, we do not agree that cetaceans can be reliably detected within the 2000 meter safety zone, even in the best of conditions (Beaufort 0). Many species of cetaceans can remain submerged for greater than 30 minutes, and some are almost impossible to detect in sea conditions greater than Beaufort 3 (which presumably would be a majority of operating conditions). In fact, it has been estimated that in anything stronger than a "light breeze", only 1 in 50 beaked whales surfacing in the direct track line of a ship would be sighted (as cited in Jasny et al. 2006, pg. 26). Moreover, sea turtles cannot be reliably detected even at extremely short distances, given their breath holding capabilities.

Passive acoustic monitoring (for use during low visibility conditions) to detect marine mammals

is also questionable. Will only audible frequencies be monitored, and if so, how will species that vocalize above our hearing range be detected? To evaluate the validity of acoustic monitoring for cetaceans, the proportion of time each species vocalizes (and how this is influenced by group size, geographic location, time of day, time of year etc) will need to be determined. There are some species of cetaceans (particularly beaked whales) for which nothing is known about the frequency range produced by vocalizing animals. In terms of active acoustic monitoring, information on the potential impact of the sonar on protected species should be obtained, and the ability to localize small cetaceans or turtles (distance at which they can be detected, probability of detection given they are in the area etc) with the system will also have to be demonstrated.

In light of these factors, both the IHA request and additional mitigation and monitoring measures proposed by NMFS fall short of allowing proper evaluation of impacts of high-intensity mid-frequency sonar deployment associated with RIMPAC. The mounting evidence that mid-frequency sonar causes serious harm and mortality to marine mammals lead to the sure conclusion that RIMPAC activities must be postponed at the minimum. Given high levels of uncertainty associated with impacts of loud underwater sounds on protected species, as well as the evidence of clear short-term behavioral impacts and possibly direct mortality (Frantzis 1998), we believe that a precautionary approach is required, and therefore RIMPAC sonar activities should be halted at once.

Thank you for the opportunity to provide comments on the U.S. Navy's IHA to allow the incidental take of marine mammals associated with Rim of the Pacific (RIMPAC) Antisubmarine Warfare (ASW) activities occurring in the Hawaiian Islands Operating Area.

Sincerely,

Alison Cohan
Conservation Committee
Pacific Whale Foundation

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1315 East-West Highway,
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MD 20910-3225.

May 20, 2006

Re: 2006 RIMPAC IHA
Federal Register I.D. 011806L

Dear Mr. Leathery,

I am concerned about the advisability of deploying various acoustical communication and SONAR technologies proposed or indicated in the 2006 RIMPAC exercises. While RIMPAC has taken place biennially since 1968 without apparent negative environmental consequences, recent naval exercises worldwide have increasingly been associated or directly implicated in catastrophic marine mammal strandings and unusual "avoidance behavior" events. This includes the Hanalei Bay "Melon Headed Whale Incident" associated with the 2004 RIMPAC.

While the U.S. Navy has characteristically denied complicity in any marine mammal strandings or harassment, it is abundantly clear that these events have occurred – and continue to occur – coincident or subsequent to, and within the acoustical reach of naval exercises. The coincidence of strandings and harassment events in temporal/spatial relationship with naval exercises is so common that it would be an extreme statistical anomaly if the subject naval exercises were not at cause for these events.

I am also troubled that conservation organizations such as NRDC, Seaflow, the Humane Society U.S., the Ocean Mammal Institute and the Animal Welfare Institute

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need to continually expend our resources and energies attempting to stem the destruction marine habitat by the US Navy. It is equally troubling that that by expressing our concerns, the "burden of proof" falls upon us who are attempting to conserve marine mammal habitat, and not the US Navy, who are proposing assaults and compromises to the environment.

While the specifics of various US Navy Sonar technologies are not available for public review, the evidence of the last five or six years suggests that new technologies are being deployed that, while being perhaps just as loud as the SQS-53C Sonar,[1] these new technologies may be utilizing signals that marine mammals are not biologically adapted to. It may be that while sound exposure levels of 140-150 dB SEL (re 1uPA) of "traditional" SQS-53C signals may be tolerable to the subject marine mammals, other more recently introduced signals are not tolerable to these animals.

Unfortunately, due to the "secure" nature of the signals used in these exercises, conservation organizations do not have access to them and must depend on information provided by the US Navy regarding the specifics of the signals. This situation further increases our burden of proof, because we do not have all of the information with which to prove that any new sonar technology is damaging to animals and habitat. In light of this, I believe that a more precautionary approach should be taken; that in place of conservation interests needing to prove that various US Navy Sonar signals are damaging to animals and habitat, the burden of proof should be shifted to the US Navy to prove that any and all technologies employed in the RIMPAC (as well as subsequent exercises) are NOT damaging to animals or habitat. This provision would include using actual sonar signals, not just modeling signals with sound level equivalencies.

I am also concerned that the RIMPAC proposal is using the Navy's Draft EIS for the USWTR proposal [2] even while the assumptions, methodologies and substantiating information in that DEIS are still in draft form and are still under review.

[1] See the 2006 Supplement to the 2002 RIMPAC PEA section 2.1.2.2
[2] Ibid. Section 4.2.1 stating that the RIMPAC ASW proposal uses the same methodology as the "Overseas Environmental Impact Statement/Environmental Impact Statement, Undersea Warfare Training Range" (OEIS/EIS) (DoN 2005b)

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For these reasons I am including my statements and comments on the Draft Overseas Environmental Impact Statement/Environmental Impact Statement for the Undersea Warfare Training Range dated December 21, 2005. These comments should be re-examined in the context of the RIMPAC IHA and included into the public record.

Given the precarious state of the oceans[3] and the international desire to maintain sustainable yields of ocean resources and long term survival of marine mammals, it would seem reasonable, even sensible, to apply the precautionary principle when the US Navy proposes implementing new technologies into our ocean habitats. It is also reasonable to require that the thresholds for the "incidental harassment" of marine mammals should not be speculative or based on incomplete models, and that the impact of any new technologies is known to be benign prior to introducing these technologies into the environment. I also cannot stress enough that the burden of proof for the safety of these technologies should be borne by the perpetrators of the proposed harassment and not borne by those of us who are attempting to conserve the oceans for ourselves and for future generations.

Sincerely,

Michael Stocker
Science Advisor,
Seaflow Inc.

Cc: Hon. Donald C. Winter (U.S. Navy)
William Hogarth (NMFS)
Donna Wieting (NMFS Office of Protected Resources)

[3] "An Ocean Blueprint for the 21st Century" Final Report of the U.S. Commission on Ocean Policy. Washington, D.C., 2004 ISBN#0–9759462–0–X and "America's Living Oceans: Charting a course for Sea Change" Pew Oceans Commission, Arlington, VA., 2003.

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Mr. Keith Jenkins
Naval Facilities Engineering Command Atlantic
Code EV21KJ
6506 Hampton Boulevard
Norfolk, VA 23508

January 24, 2006

Re: Comments on the Draft Overseas Environmental Impact Statement/Environmental Impact Statement for the Undersea Warfare Training Range (70 Federal Register 62101-62103)

Please enter this letter and recommendations into the record of decision.

Dear Mr. Jenkins,

We have taken some time to review the DOEIS/EIS for the proposed Undersea Warfare Training Range (USWTR). It is a comprehensive document and reflects much work and deliberation on the part of the preparers. Thank you for granting an extension on the public comment period on this document, as it has allowed us more time to consider the work put into it.

There are many challenges in assembling an EIS of this breadth, particularly when dealing with an environment as vast and unknown as the ocean. The paucity of knowledge on the biology, behaviors and natural history of ocean animals causes us to speculate and make many assumptions about the impacts that our enterprises will have on the subject environment and the resident biota. While there is a continuously expanding body of knowledge on the impacts of sound on the physiology and behaviors of marine animals, what we know is vastly overshadowed by what we don't know. Nonetheless, if we want to succeed in our ocean enterprises we need to move ahead based on some assumptions. But even if informed by scientific studies, our assumptions are still just speculations – based on inquiries that support our own ideas about progress. In an

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enterprise of the magnitude, importance and consequence of the Undersea Warfare Training Range, we really need to evaluate the

foundation of the assumptions that are used to justify the project. It is here where disparate perspectives and priorities need to be considered and deliberated, otherwise the project may fail in some important measure.

The purpose of this letter is to evaluate some of the assumptions the Navy has used in framing the "safe" use of our existing technologies in a complex animal habitat. It is also my intent to propose equally well informed assumptions – and facts – that refute some of the fundamental assumptions made in the DEIS used to justify the project.

I am an acoustician by trade, working in bio-acoustics and applied physics, so I will be focusing most of my comments on the marine bio-acoustic environment.

In this context, perhaps my deepest concern with the DEIS as a whole is the assumption that "Temporary Threshold Shift" (TTS) is an acceptable benchmark of safety for marine organisms. While it is true that by definition TTS is a recoverable condition, the animals subjected to this harassment are not just biological machines that predictably respond and reliably recover from calibrated stimulus, rather they are organisms that rely on a healthy, predictable habitat to thrive.

Even as a "recoverable" condition, TTS is nonetheless a symptom of physiological damage. It is like a contusion from blunt physical impact. While the contusion is also recoverable, it is still painful. A light contusion may not reveal tissue damage, and even while it may leave no lasting evidence in the tissues, it will cause "disruption of natural behavior patterns…[potentially up] to a point where such behavioral patterns are abandoned or significantly altered."[1] So TTS is physical damage. When an animal is traumatized by a painful incident, it is likely to evade circumstances similar to the conditions that caused the trauma. In this context I believe that the onset of TTS is actually where the definition of MMPA "Level A" harassment criteria sets in, not at a higher point where physical damage is not recoverable.

The further assumption made in the DEIS (section 4.3.4.2) that a 50% behavioral response is an acceptable threshold for maintaining a healthy ecosystem is questionable; it is based on the assumption that any "take" from a specific stimulus is only a brief moment from which an organism can recover unchanged. It does not account for the

[1] The threshold between MMPA "Level A" and "Level B" harassment is the threshold between behavioral disruption and physical damage,

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effects of repeated and chronic "takes" in an ecosystem subjected to continuous or periodic, multiple-source, and overlapping "takes," and other known, but unaccounted for ecosystem stress factors.

I will comment in more detail on the reasons behind my concerns below, but I believe that as a whole, we need to consider the synergistic effects of the proposed project as a 'transformation of the habitat' rather than considering the project as a set of specific incidents that have tidy 'recovery metrics' written into their implementation.

My concern for this 'transformation of the habitat' is clearly illustrated in the DEIS discussion about "expendables" dropped to the seafloor.[2] The discarded sonobuoys are emblematic of this framing: According to the DEIS, close to 8,000 of the sonobuoys will drop to the sea floor each year. In the DEIS discussion, an individual sonobuoy's contribution of lead to its immediate surroundings is justified through a model of limited dimensions. The arguments seem reasonable while looking through the narrow window of the DEIS model, but the environmental impact will prove different over time. By discarding all of these sonobuoys, somewhere between 6,000 – 7,000 pounds of lead will be deposited into the sea each year. This will be joined by copper, lithium, arsenic, capacitor electrolytes and other corroding heavy metals contained in the sonobuoys that will accumulate over the years. Using a "USEPA 1 hour exposure criteria" to justify the accumulation of all of these heavy metals over time is characteristic of the type of limited "exposure risk" assumptions used throughout the DEIS – including the assumptions used for bio-acoustic risks. Establishing the viability and safety of the entire project using these isolated sets of narrow evaluation windows does not bode well for a successful enterprise.

Of course the counter argument to this is that the sea is very large, and it can absorb these relatively tiny assaults. But over the recent years we are finding that the sea isn't as large as we thought, and that the impacts of human endeavors are seriously compromising the habitat and biota.[3]

The USWTR DEIS section 4.1.1.3 assures us that it would take 2 million years at the proposed rate to cover the sea floor of the proposed training range with expended sonobuoys. This is a specious metric, as it does not reflect the objective of the program. This metric also reveals other numerical shortcomings of the DEIS model.

[2] *Ibid*. Section 4.1.2.3
[3] An Ocean Blueprint for the 21st Century" Final Report of the U.S. Commission on Ocean Policy. Washington, D.C., 2004 ISBN#0–9759462–0–X

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First, it us unlikely that the distribution of discarded sonobuoys will be evenly distributed across the entire extents of the range; it is more likely that the center of the range will be subjected to high concentrations of sonobuoys, and the perimeters will likely have none. This distribution model should be reflected in the toxicity concentration metrics, and not obfuscated by the concept of the physical dimensions of the sonobuoys covering the entire extents of the range, which is a useless statistic.

Second, the toxicity metric proposed in Section 4.1.2.3, uses "freshwater solubility constants." The environment is salt water, so saltwater solubility constants (or corrosion rates) should be used. But even using the proposed "freshwater solubility constants, " it would only take 20 years accumulation at the proposed discard rate for the area to exceed the current EPA "1 hour limit" sited in the DEIS. The prospect of covering the floor with expended toxins without considering the toxic impacts exhibits a lack of perspective on the part of the DEIS preparers. It is just this type of limited modeling used in the DEIS that continues to justify the damaging practices that have so compromised the health of the ocean.

Another overarching concern I have is the blanket exclusion of all fish and invertebrates from consideration in terms of acoustic impacts. While the OBIS[4] has cataloged some 40,000 species of marine animals, and some 190,000 sea animals are known to science,[5] the current estimate is that there are some 2.3 million marine animals extant, and of the ~50,000 species of fish, we have audiograms on less than 100 individual species.[6] We have perhaps only a dozen audiograms on invertebrates. This situation suggests that we have much to learn about sound perception of marine animals.

Meanwhile, the executive summary Section ES 5.3, states that there is "no information available that suggests that exposure to non-impulsive acoustic sources results in fish mortality." While the absence of information does not imply an absence of harm, what particularly concerns me is the continuing comment in this section that "…While experiments have shown that exposure to loud sound can result in significant threshold shifts in certain fish that are classified as hearing specialists … these threshold shifts are temporary and it is not evident that they lead to any long term behavioral disruptions in fish that are biologically significant."[7]

[4] Ocean Biogoegraphical Information Systems http://iobis.org
[5] "Sidelines" feature in Nature Dec. 15, 2005 V. P. OBIA
[6] National Research Council Ocean Studies Board " Ocean Noise and Marine Mammals" 2003 p.87 National Academies Press.
[7] USWTR DEIS section ES 5.3 "Acoustic Effects" p.S9

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Again, the absence of evidence does not imply an absence of harm. Lacking any thorough studies on the intermediate or long term effects of threshold shifts on fish populations repeatedly exposed to active sonar signals, it is reckless to assume that disruptions would not be biologically significant.

The assumptions used in the DEIS to exclude fish and invertebrates are quite sweeping, and while they may seem plausible in the context of human experience and human priorities, they may not reflect the priorities and "experience" of the subject organisms.

There are a few simple examples of how human priority framing misses the biological responses of these animals: For example; there is a common, but erroneous assumption that fish subjected to a threatening noise will swim away from the threat to escape it. While migratory fish may evade threats by swimming away, many fish, especially sedentary fish, will "entrench" into their safe zone when threatened, and thus prolong their exposure to potentially damaging stimulus. An example of "entrenchment" behavior is used in the DEIS[8] regarding salmon exposed to 5 – 10 Hz noise. These animals retreated to deeper waters, even while the deeper water they retreated into "was near the sound source." (DEIS p.3.3-4) Of course due to the wavelength of 5 - 10 Hz tones (?=1000' to 500') in water, the location of the noise source *in situ* would not be evident to the salmon, so they just went deeper to a known 'safer' area.

Fish respond to threats in ways not clearly understood by humans. The classic "fight or flight" response we expect from terrestrial animals is not necessarily consistent across all vertebrates, so while mammals and birds will prepare for action when threatened by increasing their blood flow – through increasing their heart rate, the heart rates of many fish will decrease when they are threatened.[9] While we don't have a clear grasp on the purpose of this response, it may have to do with their need to 'become acoustically invisible' when threatened by predation. (A racing, high blood-pressure heart will convey significantly more acoustic energy into the aqueous surroundings than will a "still" heart.)

These differences in biological responses betray some of our assumptions about animal threat-response and behavior. Similar to this discussion is the assumption that all hearing animals have a need to discriminate pitch. While mammals, including marine mammals,

[8] (Section 3.3.1.2. citing Knudsen, 1994 – not listed in the reference section.)
[9] e.g.: Nestler, J. M., Ploskey, G. R., Pickens, J., Menezes, J., and Schilt, C. "Responses of blueback herring to high-frequency sound and implications for reducing entrainment at hydropower dams." 1992 North American Journal of Fish Management. V.12. p.667-683

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have organs of pitch discrimination (the cochlea) it is not clear that any other animal family has a need to discriminate pitch. It is likely that other animals have acoustical perceptions tailored to their specific habitat priorities that do not include pitch discrimination.

Almost without exception, all audiograms taken of marine animals are a comparison of frequency and amplitude sensitivities. It is possible that in lieu of pitch and level perceptions, that many fish (or other marine animals) could be sensitive to other characteristics of acoustical energy; that in place of level or time-of arrival differences between sound receptors, these animals can distinguish phase differences between "particle" and "pressure gradient" acoustical energy. In this context, time-domain cues across these physical characteristics of acoustical energy are much more important than frequency or amplitude cues.

This could cut both ways in regards to the acceptable noise levels for fish in the subject environment: Up to the point where the acoustical mechanics of the noise in the environment conflicts with the acoustical compliance of the organism, a particular fish may not even perceive the noise. This would explain why fish residing in extremely turbulent settings (brook trout or surf perch) can endure extreme, noise-saturated acoustical settings and still respond to subtle acoustical stimulus in their environment.[10]

This is germane to the DEIS because the audiograms and threshold shift procedures used to determine the acoustical sensitivities of fish in the cited studies that justify their exclusion from consideration used either sinusoidal signals or band limited 'pink' noise[11,12]. While this statement doesn't answer many questions in regard to the impacts of the noise generated by the proposed USWTR project on various fish exposed to the noises of the program, it highlights the fact that the assumptions used to frame their exclusion do not reflect the actual acoustical conditions of the proposed program. This is particularly evident in the fact that some of the proposed acoustical signals will not be

[10] J. Engelmann, W. Hanke, J. Mogdans & H. Bleckmann "Neurobiology: Hydrodynamic stimuli and the fish lateral line" 2000 Nature 408, p.51-52

[11] The DEIS cites Scholik and Yan, 2002 and Wysocki and Laddich, 2005. These studies also evaluate three fresh water species: The goldfish (*Carassius auratus*) and the Rafael catfish *Platydoras costatus*) both live in still, turbid waters, (thus their particular acoustical adaptations), and the sunfish (*Lepomis gibbosus*), a clear water inhabitant. These animals are not good models for open ocean fish that live in a completely different acoustic habitat.

[12] Band limited "Pink Noise" is typically derived from Fourier Transfer derived Gaussian noise constructed from sine waves without any coherent time-domain component.

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sinusoidal, rather some signals will include fast rise times and high "crest factors"[13] which are significantly different from sinusoidal signals.

This shortcoming can only be addressed by doing systematic testing on various fish using signals and levels that more closely match the signals proposed for the USWTR, especially the mid-frequency communication sonars that overlap the known audiological response of the subject fish and contain rich harmonic content, fast rise times, and/or crest factors at or above unity. To bring this in context to human behavioral aversion to harmonically rich signals, we need only to point to the human behavioral response to the sound of fingernails scraping across a blackboard – a signal that at even low amplitudes evokes an extreme aversion response in humans. Similarly, the sound broadcast from a C-53 sonar will also evoke a more extreme human behavioral response in humans than an equivalent sound level sinusoidal signal in the same frequency range. This fact was borne out of an empirical observation I had while reproducing a C-53 sonar signal to a live audience. At a playback level of only 55dB re: 20µPa (measured at two meters from the source) the audience recoiled – wincing and immediately blocking their ears. This was after playing back a 1kHz sine wave at an equivalent sound pressure level – which didn't evoke any unusual avoidance behavior. (55dB is 30 decibels lower than the lowest noise exposure levels established by OSHA protective guidelines for human noise exposure.)

Using the actual sonar signals to determine acoustical thresholds would clarify the impacts of the proposed signals on other marine biota (e.g. invertebrates), where the preponderance of current audiological or physiological impact data are taken from sinusoidal or 'pink noise' sources. Marine invertebrates have mechanoreceptors that are adapted to the sinusoidal motions of their environment. Sometimes these motions are relatively energetic (such as the acoustical energy generated by heavy currents and wave motions), so these animals may not be as affected by extreme sinusoidal energy. On the other hand, fast rise times or high crest factors used in some acoustical communication signals may exceed the acoustical compliance of the organism and damage it. These types of signals need to be explored with various marine invertebrates and plankton prior to excluding all of these animals from consideration in the DEIS.

There are also many questionable assumptions made in the DEIS regarding the actual levels of Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS) in marine mammals. As stated in the DEIS, PTS levels on marine mammals are unknown.

[13] Crest factor is the ration of peak to RMS value of a signal. Pure sinusoidal waves have a crest factor of .707; pure "square waves have a crest factor of 1; repetitive impulse sounds have a crest factor greater than 1.

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This is because we have not intentionally subjected marine mammals to PTS levels (for compassionate reasons). I will review the PTS assumptions below, but the foundation of the PTS assumptions used in the DEIS are made from data derived from TTS studies. Furthermore, these studies have all been done on test-habituated animals, and in many cases these animals are quite old. Additionally, some of these studies include a level of assumptions that belie the actual data. A recent study by Finneran, Carder et al. (JASA 2005)[14] used mature (18-20 years) or old (38 – 40 years) animals that have been systematically exposed to noise studies for many years. The subjects have lived in a busy environment full of anthropogenic noise, so it is highly likely that they have been habituated to the test environment. It is clear that these animals do not represent wild marine animals of the same class, across a broader – and mostly younger – age range, in a wild, natural environment.

Model inaccuracies due to habituation in the instance of this study are compounded by the fact that these animals may employ biological protections to prepare them for their tests – protections akin to the "wincing" that visual animals use to protect their eyes from damage. Terrestrial animals have a mechanism, like "wincing" in their middle ears that protect them from damaging sounds. This mechanism is a tightening of the tensor tympani muscles around the middle ear ossicles, protecting the hearing organ from physical damage.[15] While this mechanism is fast acting in response to "surprise" stimulus, once terrestrial animals are habituated to expect loud noise, the system is activated by the expectation. In humans the mechanism kicks in when noise levels reach 75dB SL (re: 20µPa) – about 10dB SL below where OSHA guidelines for TTS-level noise exposures occur in humans, and about 50dB SL below where PTS occurs.

The middle ear structure of marine mammals differs significantly from the middle ears of terrestrial animals. We are just learning about how environmental sounds are conveyed into the odontocetes' inner ears. This mechanism seems to include the lipid channels in their lower jaws,[16] and the mobility of the bulla (the bone envelope that houses the cochlea and semicircular canals). While this mechanism does include the same middle ear ossicles of terrestrial mammals, these bones in cetaceans can be rigidly attached to

[14] James Finneran, Donald Carder, Carolyn Schlundt, Sam Ridgeway "Temporary threshold shift in bottlenose dolphins (*Tursiops Truncatus*) exposed to mid frequency tones." October 2005 J. Acoust. Soc. Am. 118(4) p.2696

[15] Pierre Buser and Michel Imbert "Audition" 1992. MIT Press. p. 110 - 112.

[16] Heather Koopman, Suzanne Budge, Darlene Ketten, Sara Iverson "The Influence of Phylogeny, Ontogeny and Topography on the Lipid Composition of the Mandibular Fats of Toothed Whales: Implications for Hearing" 2003 Paper delivered at the Environmental Consequences of Underwater Sound conference, May 2003.

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each other and connected differently (by way of ligaments) to the tympanic membrane.[17] While the ears of the odontocetes or mysticetes do not have the same tensor tympani found in terrestrial mammals, it is not unlikely that these hearing specialist animals would have an analogous system to protect their inner ears from periodic or occasional sound levels that would otherwise damage their organs of hearing.[18] If this assumption is correct, then the 'sound test-habituated' dolphins would obviously yield much higher thresholds for TTS than their wild, un-habituated counterparts – given that they will always "prepare" for acoustical assaults when asked to perform in a given testing situation. Surprisingly, the DEIS addresses this "habituation issue" with exactly the opposite conclusion – that "…it is also possible that prior experiences and resultant expectations may have made some trained subjects less tolerant of the sound exposures." (DEIS Section 4.3.4 p. 4.3-22)

But even assuming that the legacy of TTS testing done on these test-habituated animals does accurately reflect the TTS levels for all wild, un-habituated animals, the data used to establish an "appropriate" TTS levels all show onset of TTS occurring between 185dB and 190dB (re: 1µPa2-s), with some examples of TTS occurring at higher levels. In the DEIS these levels are averaged in a "statistical mean" to justify raising the TTS level to 195dB.[19] This elevated level is justified in part by the statement: "Use of the minimum value would overestimate the amount of incidental harassment because many animals counted would not have experienced onset TTS." This statement in the DEIS highlights another concern; why do harassed animals need to experience onset of TTS? While it may be important to find the absolute value for onset of TTS in our model animal, the purpose here is to avoid harassing animals, not derive "statistical precision" on the exposure levels that will always produce TTS in test-habituated animals. For this reason the data should be used as found and as presented; that onset of TTS occurs in some test-habituated animals at 185dB (re: 1µPa^2-s).

As in the fish studies, none of the tests performed on marine mammals used signals that simulated the actual sonar signals proposed for the USWTR project. Most papers cited for the DEIS used either sinusoidal tones or impulse noises. These signals do not elicit

[17] G.N. Solntseva, "The auditory organ of mammals"1995 p. 455 in "Sensory Systems of Aquatic Mammals' R.A. Kastelein, J.A. Thomas and P.E. Nachtigall eds. De Spil press.
[18] This system might involve thermo-regulating the viscosity, and thus the acoustical compliance of the lipids through regulating blood circulation around the organs – thereby attenuating or accentuating acoustical transfer through the organ as needed.
[19] USWTR Section 4.3.3.1

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the same behavioral responses as more complex signals.[20] The test subjects of most papers cited for the DEIS were also older (over 30 years old), test-habituated animals that have been in captivity and used as test subjects for a large portion of their lives.[21] These animals are accustomed to coming into a test area for their livelihood and while they provide TTS data for their specific physiology, they are poor stand-ins for a majority of marine mammals that will be impacted by the USWTR operation.

Kastelein and Rippe (2000) studied younger animals (harbor porpoise *Phocoena phocoena*) with more appropriate test signals yielded significantly different results.[22] And while the harbor porpoise will not be subject to the more southern extents of the proposed USWTR ranges, these animals demonstrated an aversion to more complex signals in the frequency range of the proposed sonars and at 130dB re: 1µPa@1m. (Animals used in this study were recently taken into captivity and approximately 3 years old.) While the signals used in this study were specifically designed to repel net-predatory marine mammals, the signals are closer in form to many communication sonars than to the sinusoidal waves or band limited pink noise used in the DEIS citations. Another study by Verboom and Kastelein (2005) indicates that more complex signals induce a discomfort threshold level for younger, less habituated marine mammals (*P. phocoena* and harbor seal *Phoca vitulina*) at or below 133dB re:1µPa@1m.[23] This study extrapolates a TTS level for these animals at 150 dB(*w*) re:1µPa@1m for the harbor seal, and 137dB(*w*) re:1µPa@1m for the harbor porpoise. The paper also goes on to suggest that hearing injury – PTS, will occur in the harbor seal and harbor porpoise at 190dB and 180dB respectively.

Like the estimated PTS levels used in the DEIS, the TTS figures from the Verboom and Kastelein (2005) study are extrapolations – extrapolating results from behavioral noise-testing of young, healthy marine mammals against known human auditory responses. The disparity between the TTS figures used by Verboom and Kastelein and the figures used in

[20] R.A. Kastelein, D. Goodson, L. Lein, and D. de Haan. "The effects of acoustic alarms on Harbor Porpoise (*Phocoena phocoena*)" 1997 P.367-383 in A.J. Read, P.R. Wiepkema, and P.E. Nachigall eds. "The Biology of Harbor Porpoise" de Spil publishers, Woerned, The Netherlands.
[21] e.g. J. J. Finneran, C. E. Schlundt, D. A. Carder, J. A. Clark, J. A. Young, J. B. Gaspin, S. H. Ridgway Auditory and behavioral responses of bottlenose dolphins (*Tursiops truncatus*) and a beluga whale (*Delphinapterus leucas*) to impulsive sounds resembling distant signatures of underwater explosions. J. Acoustical Soc. of America. V.108(1) July 2000.
[22] R.A, Kastelein, H.T. Rippe " The Effects of Acoustical Alarms on the Behavior of Harbor Porpoises (*Phocoena phocoena*) in a floating pen" Marine Mammal Science 16(1) p. 46 – 64. January 2000
[23] W.C. Verboom and R.A. Kastelein. "Some examples of marine mammal 'discomfort thresholds' in relation to man-made noise." June 22, 2005. Proceedings from the 2005 Undersea Defense Technology conference 2005, Sponsored by TNO, P.O. Box 96864, 2509 JG The Hague, The Netherlands.

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the DEIS indicate a high degree of scientific uncertainty in the models and extrapolation methods used in both sets of assumptions. I am more inclined to accept the Verboom Kastelein numbers for three reasons: 1) they were not cited or crafted under the rubric of justifying a proposed program; 2) their studies were not funded by an agency whose desired actions would be limited by more precautionary results,[24] and 3) they are inherently more precautionary, in that they examine the thresholds of behavioral response, not the upper limits of physiological response.

Regarding the estimation of PTS onset relative to TTS levels used in the DEIS (Section 4.3.3.2); I find these data troubling as well. The linear regressions adapted from the W.D. Ward et al papers[25] cited in the DEIS were all taken from human subjects – highly visually adapted terrestrial mammals. Ward's research indicates a threshold of PTS by examining the maximum recoverable TTS in humans and finds that humans can recover from a TTS of 50dB without permanently damaging their hearing. The Ward studies are "conservatively" tempered in the DEIS by incorporating a study of cats by Miller[26] that indicates that cats' threshold of PTS is at 40dB recoverable TTS.[27]

The cat is also a highly visually adapted terrestrial animal, though it is more dependent on aurality than humans.[28] One correlation can be deduced here is that animals that are more dependent on sound cues are less able to recover from extreme TTS. Thus if there is a 10 dB disparity in recovery levels between humans (50dB TTS) and cats (40dB TTS), it might easily follow that cetaceans who rely almost exclusively on acoustical cues would be even less likely to recover from extreme TTS and may indicate a PTS threshold at TTS level of 30dB. If we use this assumption, the onset of PTS in cetaceans may only be 15dB above the onset of TTS.[29]

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[24] Hal Whitehead and Linda Weilgart "Science and the management of underwater noise: Information gaps and polluter power." J. Acoust. Soc. Am., Vol. 110, No. 5, Pt. 2, November 2001 142nd Meeting: Acoustical Society of America.

[25] e.g.: Ward, W.D. "Recovery from high values of temporary threshold shift." J. Acoust. Soc/ Am., 1960. Vol. 32:497–500.

[26] Miller, J.D., C.S. Watson, and W.P. Covell. 1963. "Deafening effects of noise on the cat." Acta Oto-Laryngologica Supplement Vol. 176:1–91.

[27] The DEIS states further that "A variety of terrestrial mammal data sources point toward 40 dB as a reasonable estimate of the largest amount of TS that may be induced without PTS" though no citations are provided for this statement.

[28] Ralph E. Beitel "Acoustic pursuit of invisible moving targets by cats" JASA – 1996. Vol.105(6) p.3449 This paper indicates that cats will follow acoustic cues without needing to visually identify the cue, unlike humans, who will use an auditory cue to help localize a source of noise which they will then "look for."

[29] Using the same extrapolation and linear regression found in the DEIS and using 30dB TTS as the maximum recoverable TTS level: There is a 24 dB TS difference between onset-TTS (6 dB) and onset-PTS

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Given the forgoing, we might assume from the data presented in the DEIS that the onset of TTS occurs at 185dB re: 1µPa^2-s (as shown in the DEIS without incorporating the "statistical mean" tool), and that the onset of PTS could then be as low as 200dB re:1µPa^2-s (taking the above assumption about recoverable TTS levels in highly acoustically-adapted animals). While these revised numbers are "lower" than the proposed thresholds of TTS and PTS (suggested for all marine mammals), they are based on assumptions that are still of questionable validity, inasmuch as they are based on extrapolated models that meld terrestrial, highly visual animals with old, test-weary odontocetes. I feel that this methodology provides a poor stand-in for a diverse variety of wild marine mammals, in their own habitat, being subjected to extreme levels of noise that they are not biologically adapted to or trained to expect.

Regarding the DEIS chapter 4.3.4 on behavioral effects: The authors of this chapter state that there is no metric to determine the "annoyance" levels of non-verbal animals. I suggest that the subjective term "annoyance" be replaced with the more observable characteristic of "disturbance." Many papers on disturbance levels in marine mammals are available[30] and can be used in lieu of trying to find published papers on the subjective "annoyance levels" in marine mammals.

The behavioral effects chapter (4.3.4) does mention that "…there are few observations and no controlled measurements of behavioral disruption of cetaceans caused by sound sources with frequencies, waveforms, durations, and repetition rates comparable to those employed by the tactical sonars to be used on the proposed USWTR." This statement is the first indication in the DEIS that the authors have identified that the paucity of data derived from exposing animals to actual sonar signals is a liability.

Because "(a)t the present time there is no consensus in the scientific community on how to account for behavioral effects on marine mammals exposed to continuous-type sounds" the "OEIS/EIS uses behavioral observations of trained cetaceans exposed to intense underwater sound under controlled circumstances to develop a criterion and

(30 dB).The additional exposure above onset-TTS that is required to reach PTS is therefore 24 dB divided by 1.6 dB/dB, or 15dB.

[30] e.g.: John R. Buck, Peter L. Tyack "An avoidance behavior model for migrating whale populations" The Journal of the Acoustical Society of America. April 2003. Volume 113, Issue 4, p. 2326 wherein gray whale avoidance threshold of 135dB re: 1µPa was established. See also W.C. Verboom and R.A. Kastelein. "Some examples of marine mammal 'discomfort thresholds' in relation to man-made noise." June 22, 2005. Proceedings from the 2005 Undersea Defense Technology conference 2005, Sponsored by TNO, P.O. Box 96864, 2509 JG The Hague, The Netherlands.

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threshold for behavioral effects of sound."[31] These (same) animals are again all more than 30 years old and habituated to training routines.[32] The DEIS states that these tests are most appropriate because these animals are typical of animals found in the proposed areas and exposed to "controlled, tonal sound exposures within the tactical sonar frequency range." The argument remains the same for these same animals as for when they were used in TTS testing above; they are older, test-habituated animals that have lived a large portion of their lives performing tests for a living – and they are not exposed to actual sonar-type signals. Furthermore, the behavioral tests cited here are observations of incidental responses to stimulus and do not incorporate any long term synergistic effects of continued, repeated exposures to loud sonars.

While the synergistic effect is somewhat addressed in the DEIS Section 4.3.4.3. "Likelihood of Prolonged Exposure" this consideration is only in terms of actual exposures from specific incidents. This section does not account for the synergistic effect of animals that end up avoiding familiar but compromised habitat (displacement), or the effect of the compromised habitat on the subject animals if they chose, or had to remain in the compromised habitat. An ocean habitat subjected to 161 six-hour events per year does not leave a calm, natural habitat in tact once each six hour exercise is terminated, rather it significantly modifies the habitat to include a high degree of acoustic activity throughout the year (44% of the days in a year).

In terms of other behavioral impacts of the proposed program, the DEIS also uses a "50% point" behavioral threshold "at which a significant alteration of a statistically normal behavior pattern occurs."[33] There are two reservations that arise from this metric. First, trained animals' reluctance to perform in a controlled setting – where the expectation of reward is their only performance incentive – is not a good baseline for the behavior of wild populations that are free to avoid compromised habitat – and thus may be displaced over time. Secondly, the statistical use of the "50% point" for an "all or nothing" response belies the fact that the trained animals avoid trained behaviors 10% of the time at 170dB, and show behavioral avoidance responses down to 160dB. This indicates that there is also a 'tolerance threshold' unique to trained animals where they will avoid

[31] DEIS (p.4.3-22)
[32] Schlundt, C.E., J.J. Finneran, D.A. Carder, and S.H. Ridgway. 2000. "Temporary shift in masked hearing thresholds of bottlenose dolphins, *Tursiops truncatus*, and white whales, *Delphinapterous leucas*, after exposure to intense tones." J. Acoust. Soc. of Am. 107(6), 3496-3508. Also see: Finneran, Shluntd 2005 above.
[33] DEIS 4.3.4.2 p. 4.3-26

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disturbing noise at a much lower level than the proposed 190dB, but also will tolerate a known and familiar stimulus regime because this is their 'livelihood.'

If the objective is to avoid displacing or compromising natural behaviors of wild animals, using the cited tests would indicate that the threshold for behavioral alteration is 160dB, not 190dB. This level is still significantly higher than disturbance levels indicated in tests done with "fresher" animals using sonar-like signals more akin to the signals used in the proposed USWTR program. The Verboom and Kastelein (1997) study indicates harbor porpoise avoidance behavior at 133dB, [34] and the Buck and Tyack (2003) study indicates a gray whale avoidance behavior to Low Frequency Active Sonar (LFAS) signals at 135dB.[35] These studies more accurately reflect the true conditions of the proposed USWTR and should be incorporated into the EIS.

Regarding the derivation of data for other species: The DEIS Section 4.3.5.1 states that the "absolute [frequency threshold] sensitivity has not been modeled for any baleen whale species." While this is true, it is also true (evident from the forgoing) that there are no absolute sensitivity models for any odontocetes either. Thus, using exclusively what we know about odontocetes as a model for all mysticetes does not serve the scientific rigor demanded by a proposal of the magnitude and scope of the USWTR. If we are to make assumptions about a particular order of animals, we need to consider all available data on that order and infer from that what we can for guidance prior to building a model from dissimilar species.

If we take the gray whale avoidance thresholds from Buck and Tyack, (2003)[36] and the song-length alterations of humpback whales indicated in Fristrup, Hatch and Clark, (2003)[37] we find behavioral responses that occur when the receive levels (RL) are between 130dB and 150dB. If we extrapolate the TTS levels using the threshold models from Verboom and Kastelein, (2005)[38] the TTS thresholds in some baleen whales could be as low as 160dB re:1µPa and the PTS thresholds could be 205dB re:1µPa, depending on the duration, wave shape and crest factor of the signals. While these data do not give us an "absolute sensitivity model" for all mysticetes, the data represents actual responses

[34] cf.: Verboom and Kastelein, 1997 above.
[35] cf: Buck and Tyack, 2003 above.
[36] Ibid.
[37] Kurt M. Fristrup, Leila T. Hatch and Christopher W. Clark "Variation in humpback whale (*Megaptera novaeangliae*) song length in relation to low-frequency sound broadcasts." June 2003. J. Acoust. Soc. Am. 113 (6).
[38] cf. Verboom and Kastelein, 2005 above. This study does extrapolate threshold assumptions using known human thresholds.

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from these animals, rather than inferring 'data' from a similar, but distinctly different order of cetaceans.

Regarding the "Long Term Effects" addressed in the DEIS Section 4.3.6.3; I find much of this section troubling. The opening assumption is that the "non-injurious sound exposure levels (SELs) predicted to cause TTS or temporary behavioral disruptions qualify as Level B harassment." The paragraph goes on to state that it is "highly unlikely that all behavioral disruptions or instances of TTS will result in long term impacts."

These two assumptions both require deeper scrutiny. The first assumption is that the impacts to all animals in the subject area will all be at or below the MMPA "Level B" harassment criteria. As indicated above, onset of TTS is really the threshold of MMPA "Level A" harassment, particularly when intermediate and long term effects are taken into account. This brings up the second assumption that the harassment (regardless of MMPA criteria) is "highly unlikely" to have any long term impacts.

That the preparers of the DEIS use the "Level B" argument to substantiate the claim that the noise will have no long term impact springs out of a circular argument that does not square with the obvious: The USWTR will significantly transform and alter the habitat of the proposed site. This will have intermediate and long term impacts on the resident biota. What the EIS process is attempting to determine is whether the impacts to the habitat are such that they will incur serious non-recoverable damage on that biota. The "highly unlikely" comment is an editorial comment, not borne out by scientific inquiry or methodology.

Furthermore, this editorial position is 'substantiated' by the bulleted claim that "There is no established scientific correlation between mid-frequency sonar use and long-term abandonment or significant alteration of behavioral patterns in marine mammals." This is yet another instance in the DEIS where the absence of information does not indicate an absence of harm. If this bulleted comment is to be included in the DEIS, it should be substantiated by a study demonstrating that chronic, long term use of mid-frequency sonars do not have any negative impact on the habitat. Lacking this information, and in the face of the evidence of damage incurred by mid-frequency sonars,[39] precautionary practices would infer that chronic use of mid-frequency sonars will have negative intermediate and long term effects on the habitat.

[39] e.g.: Bahamas Cuvier beaked whale strandings, 2000; The Canary Island Beaked whale strandings, 2002 ad 2004; Haro Strait/USS Shoup Incident, 2003; Hanalei Bay Melon headed whale incident 2004 .

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The second bulleted point under this section is a speculation that can be argued in any way; either the subject animals will or will not be exposed to repeated or prolonged exposures. While the limited reach of the mid-frequency sonars might in turn limit the "disturbance reach" of the signals, the high platform speeds of the signals will increase the range of disturbance incidents.

The final bullet point is perhaps the most troubling of this section, inasmuch as it indicates an observation program and infers monitoring and mitigation measures, but the mitigation Chapter 6 only speaks about monitoring and does not include provisions for what actions will be taken if "long term changes in habitat use or behavior" are noticed. I suppose at the point where long term changes are observed, "the horses will be out of the barn" already and we can only "notice" as the habitat falls apart – it being at that point far too costly to pull up the infrastructure of the USWTR and relocate it. Hopefully by being precautionary and scientifically rigorous in this proposal and development stage of the USWTR project, we can avoid this costly and unfortunate scenario.

Recommendations:

Based on the forgoing arguments, the following recommendations should be included in the USWTR EIS:

1) The toxicity model examining the impacts of discarding sonobuoys into the ocean should model the concentrations of the sonobuoys and the resulting release of toxins into the environment using the distributions of the discarded sonobuoys as a true product of where the sonobuoys are likely to land, not as a product of the synthetic distribution of the discarded sonobuoys across the entire area of the proposed range.

2) The toxicity model examining the impacts of the discarded sonobuoys should evaluate other toxins contained in the sonobuoys, such as arsenic, antimony and mercury, not just lead.

3) The toxicity model examining the impacts of the discarded sonobuoys should use saltwater solubility rates, not freshwater solubility rates.

4) Fish and marine invertebrates should not be systematically excluded from the EIS until threshold tests using actual sonar signals on these organisms are evaluated.

5) Until intermediate and long term studies on the effects of TTS on fish are done, it should not be assumed that there are no intermediate and long term effects of loud noises and TTS on these animals.

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6) Threshold evaluations for marine mammals should use studies that employ complex, sonar-like signals, not just sinusoidal or band limited noise used in the studies cited in the DEIS.

7) Temporary threshold shifts in marine mammals should not be considered a "safe and acceptable exposure level," rather TTS should be the considered the threshold for MMPA "Level A" harassment.

8) Temporary threshold shifts in any subject animal should not be considered a "safe and acceptable exposure level."

9) MMPA "Level B" harassment should begin at the threshold of behavioral disturbance and end just below onset of TTS.

10) Threshold testing studies on old, test-habituated animals should be given much less weight than threshold testing on younger, less habituated animals.

11) Existing avoidance behavior and behavioral response studies on mysticetes should be included in the DEIS.

12) Wherever possible, the use of terrestrial animals to establish physiological thresholds in marine animals should be avoided. If terrestrial animal models are used, they should be used with the caveat that the terrestrial and marine environments differ significantly, and so too the biological adaptations of the resident biota to their respective environments.

13) Sound perception models of mysticetes should use all available data on mysticetes in lieu of assuming that their hearing is the same as the two species of captive odontocetes predominantly used in the DEIS.

14) Studies used in the DEIS should include the body of internationally published literature, not just studies funded by the Office of Naval Research, studies published exclusively by U.S. institutions, or papers 'hand selected' to support the proposed program.

Sincerely,

Michael Stocker
Science Advisor,
Seaflow Inc.

Cc: Hon. Donald C. Winter (U.S. Navy)
William Hogarth (NMFS)
Donna Wieting (NMFS Office of Protected Resources)

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EARTHJUSTICE

BOZEMAN, MONTANA DENVER, COLORADO HONOLULU, HAWAI'I
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May 24, 2006

By U.S. Mail and Electronic Transmission

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Permits, Conservation and Education Division
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Re: Proposed Incidental Harassment Authorization for Rim of the Pacific Antisubmarine Warfare Exercise Training Within the Hawaiian Islands Operating Area, 71 Fed. Reg. 20,986 (April 24, 2006)

Dear Mr. Leathery,

I submit these comments on behalf of Earthjustice and the Ocean Mammal Institute in response to the National Marine Fisheries Service's ("NMFS's") request for comments on the proposed Incidental Harassment Authorization ("IHA") for Rim of the Pacific ("RIMPAC") Antisubmarine Warfare Exercise Training Within the Hawaiian Islands Operating Area. See 71 Fed. Reg. 20,986 (April 24, 2006). We write to emphasize two important points. First, because "the monitoring and mitigation proposed for the incidental harassment authorization will be insufficient to detect, much less prevent, Level A takes" of marine mammals in Hawaiian waters, NMFS should refuse to issue the requested IHA. 5/20/06 Letter from Dr. Robin W. Baird at 5 (enclosed). Second, because the U.S. Navy's Revised Preliminary Final 2006 Supplement to the 2002 RIMPAC Programmatic Environmental Assessment (dated April 2006) fails to comply with the minimum requirements of the National Environmental Policy Act ("NEPA"), NMFS must prepare its own NEPA document before making a determination on the issuance of an IHA. See 5/24/06 Letter from Earthjustice and Ocean Mammal Institute to Commander, U.S. Pacific Fleet (enclosed).

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We appreciate the opportunity to provide these comments. Please feel free to contact me should you wish to discuss our concerns.

Sincerely,

David Lane Henkin
Staff Attorney

DLH/tt
Enclosures

EARTHJUSTICE

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May 24, 2006

By U.S. Mail and Facimile Transmission

Commander, U.S. Pacific Fleet (N01CE1)
251 Makalapa Drive
Pearl Harbor, Hawai'i 96860
Fax No.: (808) 474-5494

Re: Revised Preliminary Final 2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment

Dear Commander,

I submit these comments on behalf of Earthjustice and the Ocean Mammal Institute in response to the April 24, 2006 Federal Register notice requesting comments on the U.S. Navy's application for an Incidental Harassment Authorization to take marine mammals, by harassment, incidental to conducting Rim of the Pacific ("RIMPAC") antisubmarine warfare ("ASW") training events. See 71 Fed. Reg. 20,986 (Apr. 24, 2006). The notice stated the Navy is accepting public comment on its Revised Preliminary Final 2006 Supplement to the 2002 RIMPAC Programmatic Environmental Assessment, dated April 2006 ("2006 SPEA"). As detailed below, the 2006 SPEA's discussion of impacts on marine mammals associated with the Navy's proposed use of mid-frequency active sonar during ASW training events fails to comply with Congress's command in the National Environmental Policy Act ("NEPA") to take a hard look at the environmental consequences of the Navy's proposed course of action. The Navy must revise its 2006 SPEA to provide full and accurate disclosure of the potentially significant impacts on marine mammals from the proposed ASW exercises, as well as to address the cumulative effects of planned use of mid-frequency active tactical sonar within the Hawaiian Islands and other activities adversely affecting Hawai'i's marine mammals. Moreover, because of the potential for significant impacts, whether considering RIMPAC activities in isolation or in conjunction with other federal and non-federal activities, a comprehensive environmental impact statement ("EIS") is required.

The 2006 SPEA's discussion of potential impacts to marine mammals improperly fails to disclose the latest research, which conflicts with the Navy's claim "there have been no confirmed acoustic effects to any marine species in the previous 19 RIMPAC Exercises or from any other mid-frequency active sonar training events within the Hawaiian Islands Operating Area." 2006 SPEA at 4-14. In April 2006, the National Marine Fisheries Service ("NMFS") issued its final report on the mass stranding of between 150 and 200 melon-headed whales that occurred in Hanalei Bay during the last RIMPAC exercises. See Southhall, B.L.R., et al. 2006. Hawaiian melon-headed whale (*Peponacephala electra*) mass stranding event of July 3-4, 2004. NOAA

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Technical Memorandum NMFS-OPR-31.[1] The report concluded that "the active sonar transmissions of July 2-3, 2004, [are] a plausible, if not likely, contributing factor" to the mass stranding. Id. at 45.[2] This is a far cry from the 2006 SPEA's discussion, which inaccurately states it is "improbable" that the use of sonar during the 2004 RIMPAC exercises had anything to do with the mass stranding. 2006 SPEA at 4-19. The incomplete and misleading discussion in the 2006 SPEA falls far short of satisfying NEPA's command to ensure that accurate environmental information "is available to public officials and citizens before decisions are made and before actions are taken." 40 C.F.R. § 1500.1(b).

Moreover, the Navy's reliance on the alleged absence of "confirmed acoustic effects" to marine species from previous use of mid-frequency active sonar in the Hawaiian Islands to downplay impacts is arbitrary, since it ignores the inadequacy of past (and proposed future) monitoring to detect such effects. 2006 SPEA at 4-14. As explained in the comments of marine mammal expert Dr. Robin W. Baird (enclosed), the likelihood of detecting animals injured or killed by sonar use during RIMPAC exercises "is extremely low" due to a host of factors, including the limited monitoring effort, "the prevailing direction of currents in Hawai'i, and the large number of large sharks which scavenge carcasses." 5/20/06 Baird Letter at 5. Thus, should the Navy proceed with ASW exercises proposed for RIMPAC 2006, "the monitoring and mitigation proposed ... will be insufficient to detect, much less prevent, Level A takes, particularly of Cuvier's and Blainville's beaked whales." Id.

Dr. Baird's comments make clear the Navy has no basis for claiming there have been no significant impacts on marine mammals during past RIMPAC exercises. Moreover, the 2006 SPEA's assertion "it is extremely unlikely that any significant behavioral response will result from the interaction of beaked whales and the use of sonar during the [upcoming] RIMPAC Exercise," 2006 SPEA at 4-9, cannot be squared with Dr. Baird's conclusion, based on years of research in the Hawaiian Islands, that the Navy cannot, in carrying out proposed ASW exercises, avoid significant threats of injury to Cuvier's and Blainville's beaked whales. See 5/20/06 Baird Letter at 5; see also 16 U.S.C. § 1362(18)(C) (defining "Level A harassment").

Even if the Navy disagrees with NMFS's or Dr. Baird's conclusions, it is still obliged to disclose and address these opposing scientific viewpoints in its NEPA analysis. See 40 C.F.R. § 1502.9(b). Failure to do so violates congressional intent "to internalize opposing viewpoints into the decision-making process to ensure that [the Navy] is cognizant of all the environmental trade-offs that are implicit in [its] decision." California v. Block, 690 F.2d 753, 771 (9th Cir. 1982).[3]

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[1] A copy of the report, which is available on-line at http://www.nmfs.noaa.gov/pr/health/mmume/event2004jul.htm, is enclosed for your convenience.

[2] NMFS's conclusion was based on, among other things, "the absence of any other compelling causative explanation." Id.

[3] Similarly, even if the final version of NMFS's report did not come out until after the 2006 SPEA was prepared, the Navy would not be absolved of its obligation to disclose and

The 2006 SPEA's failure to analyze the environmental impacts associated with other activities involving acoustic effects from mid-frequency active tactical sonar within the Hawaiian Islands violates NEPA's mandate to discuss cumulative impacts, which are "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." 40 C.F.R. § 1508.7; see also id. § 1508.25(a)(2). The Navy is not excused from including such analysis in the 2006 SPEA merely because it promises to evaluate these activities in future NEPA documents. See 2006 SPEA at 4-23 (noting preparation of Pacific Missile Range Facility EIS and Overseas EIS/EIS for Navy Readiness Activities in the Hawaiian Islands). NEPA requires consideration of such impacts before the Navy makes its decision on the proposed ASW exercises.

Moreover, the Navy cannot lawfully fail to consider the cumulative impact on Hawai'i's marine mammals of activities other than mid-frequency active tactical sonar use, "regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7. Marine mammals in Hawaiian waters are threatened by a wide variety of activities, from interactions with commercial fisheries to entanglement with marine debris to strikes by tour boats. The 2006 SPEA fails to consider the cumulative impacts of any such actions, which, even if "individually minor" may be "collectively significant." Id.[4]

Section 4.3 of the 2006 SPEA makes clear the current proposal for ASW training is merely one part of a large-scale plan for use of mid-frequency sonar in the Hawaiian Islands. All of these actions have cumulative or synergistic environmental effects, which must be considered in a single EIS. The Navy cannot avoid its obligation to prepare an EIS by dividing its program for sonar use into multiple actions, each of which individually has an insignificant environmental impact, but which collectively have a substantial impact. Id. § 1508.27(b)(7).

Even viewing the proposed RIMPAC exercises in isolation, there can be no serious question but that an EIS is required. As the attached comments from Dr. Baird and the NMFS report make clear, proceeding with proposed ASW exercises has the potential to cause significant impacts to marine mammals in Hawaiian waters. Even if the Navy disagrees with this assessment, the substantial controversy regarding the possible effects on the environment provides another trigger for the requirement to prepare an EIS. 40 C.F.R. § 1508.27(b)(4).

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address the report's conclusions. The NMFS report clearly presents "significant new ... information relevant to environmental concerns and bearing on the proposed action [and] its impacts." 40 C.F.R. § 1502.9(c)(1)(ii).

[4] The Navy cannot rely on its 2002 and 2004 analyses of RIMPAC, which similarly failed to analyze cumulative impacts.

We appreciate the opportunity to provide these comments which hopefully will prompt the Navy to satisfy its obligations under NEPA by preparing an EIS. Please feel free to contact me should you wish to discuss our concerns.

Sincerely,

David Lane Henkin
Staff Attorney

DLH/tt
Enclosures

cc: Steve Leathery, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service

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May 20, 2006

Stephen L. Leathery
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20910

Dear Steve,

I am writing to provide comments in regards to the Navy's request for an Incidental Harassment Authorization in relation to the RIMPAC exercise in Hawai'i. My basis for these comments comes primarily from undertaking research on odontocete cetaceans in Hawai'i each year since 1999. This research has involved small vessel surveys around all of the main Hawaiian Islands, covering over 34,000 km of trackline, searching for all species of odontocetes (with an emphasis in the last four years on beaked whales), as well as undertaking studies of stock structure and diving behavior. During this period we have collected information from 741 sightings/encounters with 16 species of odontocetes. While some of the results of this work are available in various publications and reports (see www.cascadiaresearch.org/robin/hawaii.htm), the work is on-going and as such most is unpublished.

Based on my review of the information presented in NMFS' proposed incidental take authorization (Federal Register, I.D. 011806L), the Navy's application for an Incidental Harassment Authorization (IHA application), and the Navy's 2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment (2006 PEA), I question the efficacy of the proposed mitigation/monitoring that will be in place. In particular I outline below why:

1) estimates of cetacean densities used in modeling and estimating numbers of individuals to be exposed to high-intensity sounds are underestimated such that the estimate of takes will also be underestimated;

2) population sub-division has not been taken into account, thus the proportions of some populations predicted to be exposed/taken will be greater than that indicated;

3) aerial reconnaissance is insufficient in determining the presence of many species of deep-diving cetaceans due to long dive times and unfavorable sea states;

4) the geographic scope of land-based coverage for animals that may potentially be exposed to sounds in the Alenuiuhaha Channel is inadequate; and

5) limiting sonar use outside of 25 km from the 200 m isobath is insufficient in mitigating impacts on beaked whales and other species.

Several other issues relevant to mitigation and predicting impacts are also discussed below.

Estimated marine mammal densities used in modeling

There are a number of issues associated with the estimated densities used in modeling exposure/takes. The IHA application (page 9, also the 2006 PEA) notes that estimates of densities for modeling exposure of animals within 25 nm of the islands (Table 3-2) were based on Mobley et al. (2000). There are several reasons why use of the Mobley et al. (2000) aerial survey data results in under-estimates of density for some species (and thus under-estimates of the numbers/species of animals exposed to sounds). Densities of long-diving species (e.g., beaked whales, *Kogia* spp., see below), and species that are difficult to detect except in particularly good sea states (e.g., beaked whales, *Kogia* spp.) are negatively biased from aerial surveys. Table 3-2 in the Navy's application notes no dwarf sperm whales within 25 nm of shore, yet this species was the fifth-most frequently encountered species within that range in a recent survey off the island of Hawai'i (Baird unpublished, see also Baird 2005). Table 3-2 also notes no pygmy killer whales within the inshore (within 25 nm) strata, yet there is a small population of apparently resident pygmy killer whales found within 25 nm of shore off the island of Hawai'i (McSweeney et al. 2005). In terms of under-estimating the density of beaked whales, Mobley et al. (2000) acknowledge this (pg. 6), noting that "the abundance estimates presented here for beaked whales and sperm whales probably underestimate the true abundance by a factor of at least two to five", and Barlow and Gisiner (2006) note that an even smaller fraction of beaked whales (approximately 7% of Cuvier's and 11% of Mesoplodon) are likely detected when directly on the trackline, with even lower proportions detected to the side of the aircraft. Abundance/density estimates for two other species (melon-headed whales, rough-toothed dolphins) from Mobley et al. (2000) are substantially lower than abundance determined by mark-recapture analysis based on photo-identification. In the case of rough-toothed dolphins, Mobley et al. (2000) provide an estimate of 123 individuals (CV=0.88) around all the main Hawaiian Islands, while a mark-recapture estimate for the "marked" population off Kaua'i and Ni'ihau (only a fraction of the area covered by Mobley et al) is 1,759 (CV=0.33) (Baird et al. unpublished manuscript). Thus because aerial surveys underestimate cetacean abundance (and in the case of dwarf sperm whales and pygmy killer whales did not result in any sightings), the estimated number of takes within 25 nm of shore are underestimated.

Population sub-division not taken into account

Evidence from genetic studies of all species so far studied around the Hawaiian Islands (short-finned pilot whales, false killer whales, bottlenose dolphins, spinner dolphins) have indicated that animals around the main Hawaiian Islands are reproductively differentiated from animals elsewhere in the tropical Pacific (see Chivers et al. 2003; Martien et al. 2005; Andrews et al. 2006). In the case of spinner dolphins and bottlenose dolphins, there appears to be additional population structure within the main Hawaiian Islands (Martien et al. 2005; Andrews et al. 2006), with genetic differentiation and no evidence of movements of individuals among the four main groups of islands. Thus, utilizing abundance estimates for the entire Hawaiian EEZ may not be appropriate in determining the proportion of the total population that may be exposed to sounds (Federal Register Table 1). In these cases, the actual proportion of the population

exposed to sounds should be greater than that indicated in Table 1, suggesting that any impacts may affect a much larger proportion of these populations. For example, with bottlenose dolphins the estimated abundance within the OpArea (Table 1 in Federal Register) is 3,263 individuals, and the estimated takes include 1,183 individuals (Table 1), resulting in an estimated 36% of the total population that may be taken. However, based on genetic (Martien et al. 2005) and photo-ID evidence (Baird et al. 2002, 2003, 2006), including mark-recapture analyses (Baird et al. 2001), there is likely a small reproductively isolated population around each island (e.g., off Maui/Lana'i the mark-recapture estimate was 134 individuals; Baird et al. 2001). Thus it is likely that the estimates of the proportion of some populations that may be taken are strongly negatively biased.

Efficacy of aerial reconnaissance in mitigation/monitoring

Several species of odontocetes in the area of interest may dive for extended periods and therefore will have a very low probability of being detected through aerial overflights. For example, Blainville's beaked whales and Cuvier's beaked whales have been documented diving for periods of up to 83 and 87 minutes, respectively, in Hawai'i (Baird unpublished; Baird et al. 2005), and regularly dive for periods of 50-60 minutes. Short-finned pilot whales may dive for periods of up to 27 minutes in Hawai'i (Baird unpublished). Dwarf and pygmy sperm whales (*Kogia* spp.) are also known to dive for extended periods. Thus the likelihood of any of these species being detected by aerial reconnaissance is extremely low, even in ideal sea conditions. Unfortunately, the area of the choke-point exercises in the Alenuihaha Channel is one of the windiest areas around the main Hawaiian Islands, with wind speeds typically in the range of 10-15 m/sec (see http://oceanwatch.pifsc.noaa.gov/ssmi/ssmi_hawaii.html), even further reducing the likelihood of detection of these species, or any species of cetacean. Barlow and Gisiner (2006) note that "the effective search width [for beaked whales] is typically only 250-500 m (on each side of the aircraft) for aerial observers searching by naked eye in good to excellent sighting conditions". Given the typically windy sea conditions in the Alenuihaha Channel and in offshore waters in Hawai'i, it is clear that the use of aerial reconnaissance to effectively detect animals within the range of sonar operations will be ineffective.

Geographic scope and species coverage from land-based reconnaissance in the Alenuihaha Channel

The land-based reconnaissance for activities to be undertaken in the Alenuihaha Channel (Federal Register, 2006 PEA) note that such reconnaissance will be undertaken between Mahukona and Lapakahi on the island of Hawai'i. The distance between the Mahukona Lighthouse and the southern boundary of the Lapakahi State Park is approximately 2 km (the exact boundaries of the land-based reconnaissance area are not given in the FR notice). Using the southern boundary of Lapakahi State Park as the SW limit, the linear length of the coastline immediately bordering the southern part of the area outlined for the choke-point exercise in the Alenuihaha Channel is approximately 28 km. The justification for monitoring only such a small proportion of the near-shore area in the Channel is not given (nor is it noted why no shore-based monitoring would be undertaken off the other two islands bordering this channel). Given the typical densities of odontocetes in Hawaiian waters, the likelihood of detecting groups along a 2-km stretch of coastline on any particular day is extremely small. In addition, the near-shore bathymetry on the south side of the Alenuihaha Channel is generally relatively gentle, i.e., there is no deep (>200 m) water within several kilometers of shore. Thus the species that typically use

the area where land-based observers will be able to document groups are primarily spinner dolphins, bottlenose dolphins, and rarely false killer whales. Some of the species that are thought or known to be most susceptible to impacts from high-intensity mid-frequency sonars (e.g., beaked whales, pilot whales, melon-headed whales) do not occur close enough to shore in this area to be detected from land-based observers. Besides the limited geographic coverage of the land-based site, it is difficult to evaluate the efficacy of this monitoring as no information is presented on the elevation of the observation site, the number of observers, or the methods used to detect cetaceans (e.g., naked eye, 8x binoculars, 25x binoculars, etc).

Limiting sonar use within 25 km of the 200 m isobath is ineffective at limiting exposure

One mitigation measure proposed (Federal Register, 2006 PEA) to minimize exposure to sonar is that "with the exception of three specific choke-point exercises [ ], the Navy will not operate mid-frequency sonar within 25 km of the 200 m isobath". Based on sighting data of Blainville's and Cuvier's beaked whales off the island of Hawai'i (Baird et al. 2005; Baird unpublished), using 25 km from the 200 m isobath as a cut-off point for sonar use will not be effective at limiting exposure of these two species. A quantitative analysis of sighting and effort distances in relation to the 200 m isobath based on these survey data has not been undertaken, however, the distance of sightings from the shoreline for all odontocete sightings and the distance from the 200 m isobath for the furthest offshore beaked whale sightings have been measured. For both Cuvier's and Blainville's beaked whales, the farthest from shore that we have documented these two species is 48.8 km, and these two sightings were approximately 38 km from the 200 m isobath. We have also documented most other species at distances far greater than 25 km from shore (bottlenose dolphins, 30.5 km; dwarf sperm whale, 35.7 km; false killer whale, 69.8 km; melon-headed whale, 43 km; pantropical spotted dolphin, 40.5 km; pygmy sperm whale, 30.2 km; Risso's dolphin, 33 km; rough-toothed dolphin, 49.8 km; sperm whale, 47.2 km; striped dolphin, 36.7 km), despite the fact that the majority of our survey effort is within approximately 30 km of shore. In most areas along the west coast of the island of Hawai'i, the 200 m isobath is within 1-2 km of shore, so these sighting distances are likely all far outside of 25 km from the 200 m isobath. In addition, in the area to the west of the island of Hawai'i there are a number of seamounts that rise to within 1,000 m of the surface. The area offshore west of the island of Hawai'i is also characterized by regular cyclonic eddies which increase productivity (Seki et al. 2001, 2002) and likely result in greater densities of cetaceans far from shore. If the purpose of such a mitigation measure is to reduce the likelihood of exposure of species/individuals which may associate with steeply sloping areas (e.g., Blainville's beaked whales, short-finned pilot whales), or areas of high productivity, sonar use should be excluded from the area with seamounts and cyclonic eddies west of the island of Hawai'i, and the exclusion of sonar within 25 km of the 200 m isobath should be extended to a greater range. While the above-noted discussion focuses on sightings off the island of Hawai'i, it is likely that most of these species also occur >25 km outside of the 200 m isobath off the other islands, though we have not had enough survey effort offshore of these islands to demonstrate this.

Power to detect effects

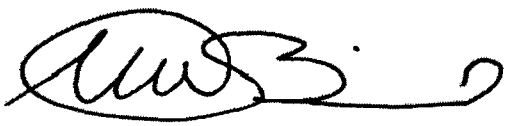
No information is presented on the statistical power (the probability of rejecting a false statistical null hypothesis) of the monitoring/mitigation plan. In particular, it should be possible to estimate statistical power based on the proposed level of monitoring, estimated densities of different species, and the probability of detecting different species. As well, it should be possible

to estimate the probability of detecting unexpected impacts (e.g., strandings) that may adversely affect the species or stocks involved. Statistical power is directly related to sample size and effect size; as sample size or effect size increases, so does statistical power. In this case, whether the null hypothesis (for simplicity, that as a result of monitoring and mitigation there are no Level A takes of cetaceans due to RIMPAC) is true or false is unknown. If the null hypothesis is false (i.e., there are Level A takes of cetaceans due to RIMPAC), the question is whether the planned monitoring efforts have enough power to detect such effects, or, in the case of monitoring to reduce impacts, whether the monitoring has a high likelihood of detecting groups of animals that can or may be exposed to high sound levels. Based on the level of monitoring outlined, the low density of most species of odontocetes in Hawai'i, and the low likelihood of detecting long-diving/cryptic species, the effective sample size in this monitoring plan is low, and thus the power to detect impacts and assess the presence of animals to reduce impacts are low. If there are unexpected impacts (e.g., animals which strand or move into shallow waters), the likelihood of detecting such impacts are small unless the animals move into an area under direct monitoring (e.g., between Mahukona and Lapakahi on the island of Hawai'i), or into an area with regular access by people. In addition, given the prevailing direction of currents in Hawai'i, and the large number of large sharks which scavenge carcasses, the likelihood of dead animals stranding (and thus having a higher chance of being detected) is very low. Certainly in the area of the Alenuihaha Choke Point Exercises there are huge areas of coastline that do not appear to be monitored under the existing monitoring plan (e.g., along Kaho'olawe, the south coast of Maui, much of the Kohala Peninsula), and thus the power to detect unexpected impacts is extremely low.

In conclusion, for the reasons outlined above it appears that the monitoring and mitigation proposed for the incidental harassment authorization will be insufficient to detect, much less prevent, Level A takes, particularly of Cuvier's and Blainville's beaked whales.

If you would like any additional information on any of the analyses noted above, please do not hesitate to contact me.

Sincerely,



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22nd May 2006

Dear Mr Leathery

Small Takes of Marine Mammals Incidental to Specified Activities; Rim of the Pacific (RIMPAC) Antisubmarine Warfare (ASW) Exercise Training Events within the Hawaiian Islands Operating Area (OpArea)

WDCS, the Whale and Dolphin Conservation Society, is a conservation and welfare organization representing over 80,000 members and supporters worldwide, with offices in the US, UK, Germany, Argentina and Australia. Since its inception in 1987, WDCS has funded and conducted extensive research on issues relating to cetaceans in the wild and in captivity, and is recognized internationally as a respected source of information on the scientific, biological, political and legal aspects of cetacean protection. WDCS currently supports over 40 conservation field projects worldwide, and serves as a global voice for the protection and conservation of whales and dolphins and their environment, through campaigns, scientific research, field projects, legal advocacy and educational outreach programs. We thank you for this opportunity to provide comments concerning potential impacts of RIMPAC exercises on marine mammals.

Regardless of the mitigation measures undertaken, we do not believe that enough is understood about the impacts of mid-frequency sonar on cetaceans to determine a negligible impact determination. Nor do we believe that it is possible to assert that the RIMPAC ASW exercises are highly unlikely to result in the serious injury or death of a marine mammal.

We concur that should serious injury or death of a marine mammal occur (bearing in mind the unlikelihood of detection should this happen), sonar transmissions from all countries involved should be ceased with immediate effect. In addition, a full and transparent investigation should be undertaken with immediate effect.

There is not enough evidence to assert 173 dB re 1µPa as a precautionary level of behavioural disturbance. Indeed, beaked whales that died in the Bahamas incident were exposed to 130 - 140 dB re 1µPa, i.e. much lower levels than this (Hildebrand and Balcomb, 2004). The limitations of extrapolations between species and differing situations, including captive animals, which result in such 'precautionary' levels, have been well documented.

It is not appropriate that only mid-frequency active tactical sonar is determined to have the potential to affect marine mammals, particularly given the number of countries involved in the exercise. That numerous ships, submarines and other vessels and aircraft will be involved in the exercise can not be discounted and each of these, as well as the cumulative impact of them all, is likely to be significant.

The lack of understanding of mechanism of injury, especially in beaked whales, is acknowledged. That three species of beaked whales are known to inhabit the exercise area, and given the number of strandings involving beaked whales associated with the use of sonar to date that have resulted in death, the predicted behavioural disturbance of beaked whales must be considered as Level-A harassment.

Given the size of the exercise area, entire habitats or migration paths may be blocked. We are particularly concerned for those cetacean populations and individuals that are resident in the OpArea during the exercise. Local impacts can have population-level consequences where these populations are genetically or behavioural distinct.
It is therefore critical that long term population monitoring be undertaken. This should investigate the health of the populations in the region over a suitable time-frame and be capable of measuring potential impacts. Such a study should be independent.

Mitigation measures
Marine mammal observers should be dedicated to the job of marine mammal observations. Observers should be independent to ensure commitment to the role in hand. Training courses should incorporate an eye test, practical field training, extensive theoretical training (including seismic survey, underwater acoustics, marine mammal identification and passive acoustic monitoring modules) and assessments. In addition:

- Observations should be conducted from all platforms, both on the sonar ships and in the aircraft, at all times during day-light. Observers should be available in enough numbers to ensure that individuals are fully rested and a full watch is possible.

- Mitigation out to the required distance can not be assured and so operations should cease at night.

- Closed areas should be surrounded by appropriate buffer zones.

- Passive acoustic monitoring should occur throughout the exercise and not only prior to the commencement of ASW operations involving active mid-frequency sonar. A PAM operator should be dedicated to mitigation. PAM technology should be further developed so that accurate ranges can be determined to vocalising animals, and official PAM guidelines should be developed for implementing mitigation measures based purely on acoustic detection. A PAM training scheme is required, particularly since mitigation measures may be based on the PAM operators' judgement.

Temporarily reducing source levels is not a sufficient mitigation measure. Sonar transmissions should cease should a marine mammal be detected within at least 1000 metres of the sonar dome. Sonar operations should *not* be permitted in strong surface ducting conditions.

Whilst extra measures in near coast channels are proposed, we are concerned that it is impossible to know to what degree environmental factors such as bathymetry, surface ducts and constricted channels play a part in strandings, when numerous noise induced strandings have now been recognised when these conditions do *not* exist. Further, the increasing numbers of lethal events that do not include strandings, where mortalities occur at sea that are occurring are worrying, particularly without the critical information about the mechanisms that lead to death.

Aerial and beach surveys should be undertaken throughout the exercise period to look for dead animals. Full necropsies should be required, undertaken by an "unbiased" source and information made available publicly within a specified time period.

Recommendations
We understand that the RIMPAC Operational Order Environmental Annex (Appendix A) includes specific measures that are to be followed by all exercise participants. We firmly believe that *all* countries involved in the exercise training should apply the same management and mitigation standards as those adopted by the US Navy.

A detailed log of sonar use should be kept and made available should an incident occur.

The detailed environmental report that will be available to NMFS should be made publicly available, within a specified timeframe of completion of the exercise.

There should be improved and ongoing biological monitoring before, during and after seismic surveys, to provide information on species occurrence, seasonal/temporal distribution. A commitment to investigate the effectiveness of mitigation measures undertaken is long overdue. Effort should be also be made to examine the efficacy of commonly used mitigation measures.

In conclusion
The marine mammal mitigation measures currently in use worldwide show considerable variation in parameters such as the exclusion zone radius, the marine mammal species subject to mitigation, and delay/shut-down procedures. Relatively few aspects of current mitigation have a firm scientific basis and proven efficacy in the field, and there remains a total lack of effective mitigation during night and adverse weather.

Regardless of the mitigation measures undertaken, we do not believe that enough is understood about the impacts of mid-frequency sonar on cetaceans to determine a negligible impact determination. Nor do we believe that it is possible to assert that the RIMPAC ASW exercises are highly unlikely to result in the serious injury or death of a marine mammal.

Yours sincerely

Sarah Dolman
WDCS International Science Team

CC: Senator Robert Hill, Minister for Defence, Parliament House, ACT 2600, Australia
Rt Hon Des Browne MP, Secretary of State for Defence, House of Commons, London, SW1A 0AA, UK

Hildebrand, J. and Balcomb, K. 2004. Presentation at the Third Plenary Meeting of the Advisory Committee on Acoustic Impacts on Marine Mammals, 27-29 July, San Francisco.
http://mmc.gov/sound/plenary3/pdf/hildebrand-balcomb.pdf

May 24, 2006

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COMMENTS BY THE CENTER FOR REGULATORY EFFECTIVENESS ON NAVY RIMPAC ASW IHA APPLICATION

(By emailmailto:PR1.011806L@noaa.gov:
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Dear Mr. Leathery:

The Center for Regulatory Effectiveness ("CRE") appreciates this opportunity to comment on the Navy's application for Incidental Harassment Authorization ("IHA") referenced at 71 Fed. Reg. 20986 (April 24, 2006).

For several reasons, we believe the Navy should be granted an IHA for these sonar training exercises. Not the least of these reasons is the fact that the Navy exercises are necessary for the national defense and security.

We also believe that the IHA should contain reasonable mitigation and monitoring requirements in order to protect marine mammals. We are concerned, however, with the National Marine Fisheries Service's ("NMFS") proposed use of 173 dB (SEL or energy flux density level, total over all sonar emissions, referenced to 1 µPa2-s) as the Level B behavioral effects threshold for mid-frequency sonar. We believe that this 173 dB level is not supported by the best available science and data. We believe that a 190 dB threshold is more consistent with the best available science and data.

We understand that the NMFS proposed the 173 dB threshold based in part on observations of orca behavior during the USS Shoup operations in Haro Strait, and on model analyses of the Shoup sonar operations. Neither the observations nor the model analyses support the 173 dB threshold.

With regard to orca behavior, the Navy reported that

> " A review of a videotape by Navy marine mammal experts showing the orca J-Pod during Shoup's Haro Strait transit indicates the orca behaviors displayed were within the

species' normal range of behaviors, and no immediate or general overt negative behaviors were depicted." [1]

We know no reason to doubt the Navy's report.

With regard to the Shoup modeling, we understand that the 173 dB threshold was in part derived from NMFS' algorithms ("EEEL") as applied to measurement and other data produced by the Navy. [2] The NMFS inappropriately applied its algorithms to the Navy data because the algorithms mix up total received energy with other metrics such as exchange rate and average energy. This confusion of different metrics causes inaccurate model estimates of actual received energy levels. Use of consistent metrics produces model results supporting the 190 dB threshold level.

We once again thank you for the opportunity to submit these comments.

Sincerely yours,

Scott Slaughter
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[1] *Summary Data for USS Shoup Repor*t, Navy Region Northwest Public Affairs Office (Feb. 9, 2004), available online at http://www.cpf.navy.mil/news_images/special_projects/shoup/SUMMARY%20DATA.pdf

[2] See, *e.g.*, *Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington* (NMFS, January 2005), avilable online at http://www.nmfs.noaa.gov/pr/pdfs/acoustics/assessment.pdf.